THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVI. No. 1683.] LONDON, AUGUST 13, 1895. [47TH YEAR. PRICE 6d.

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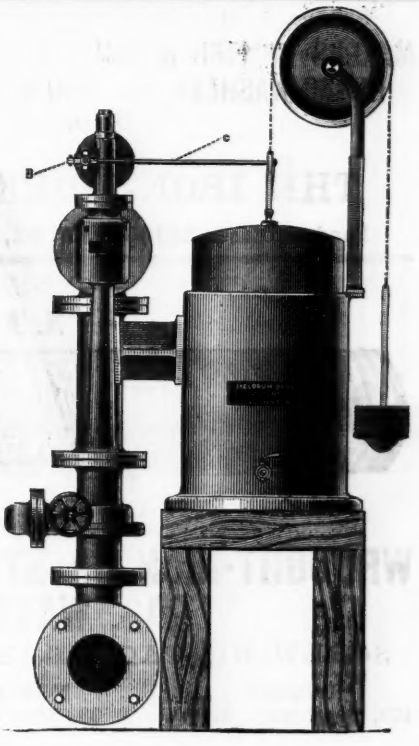

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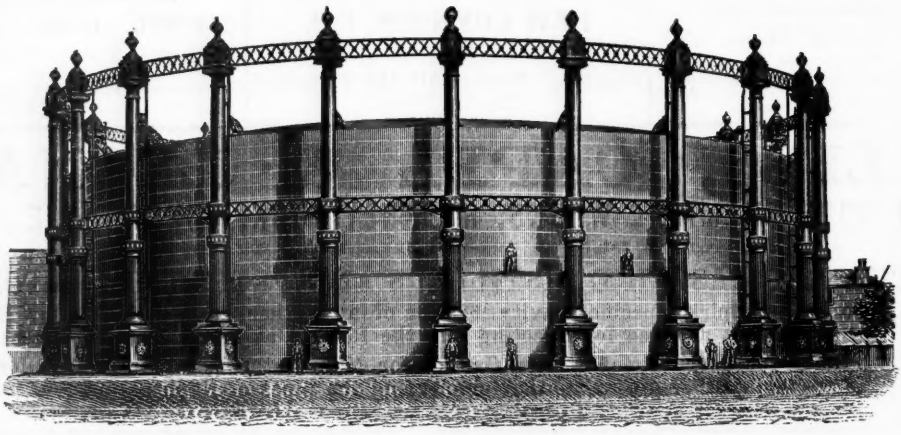

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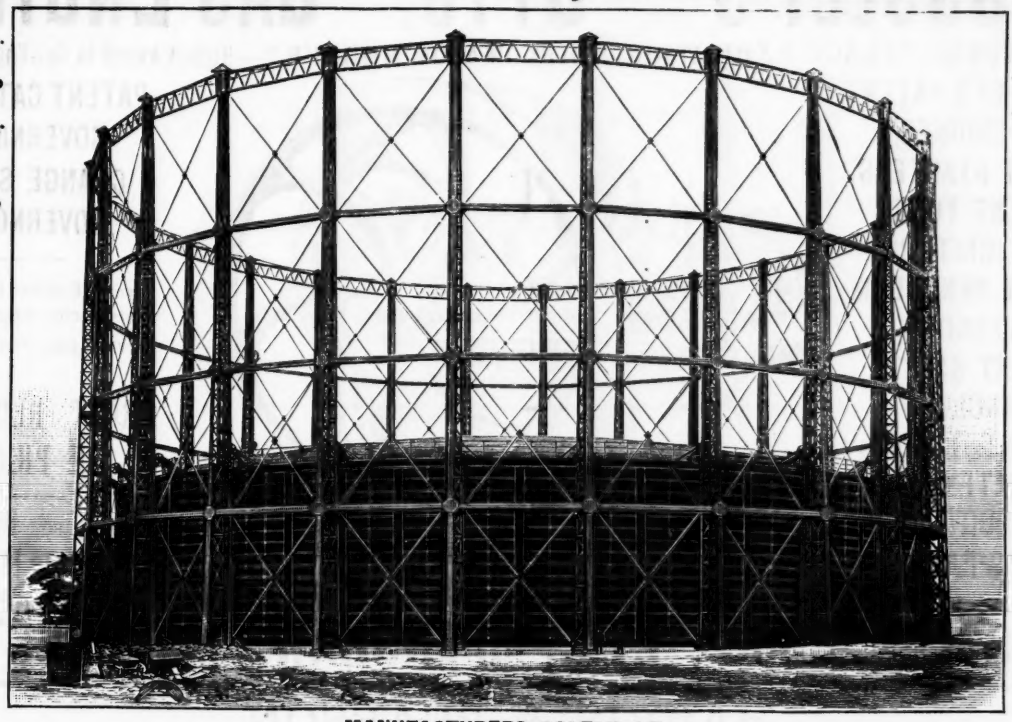

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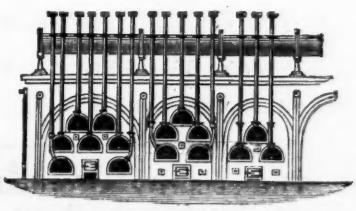

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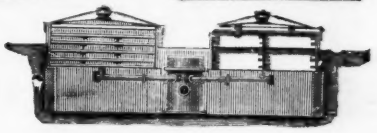

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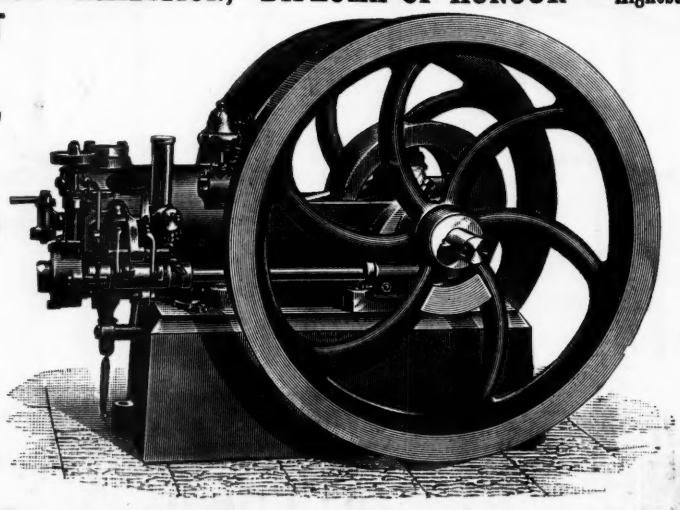

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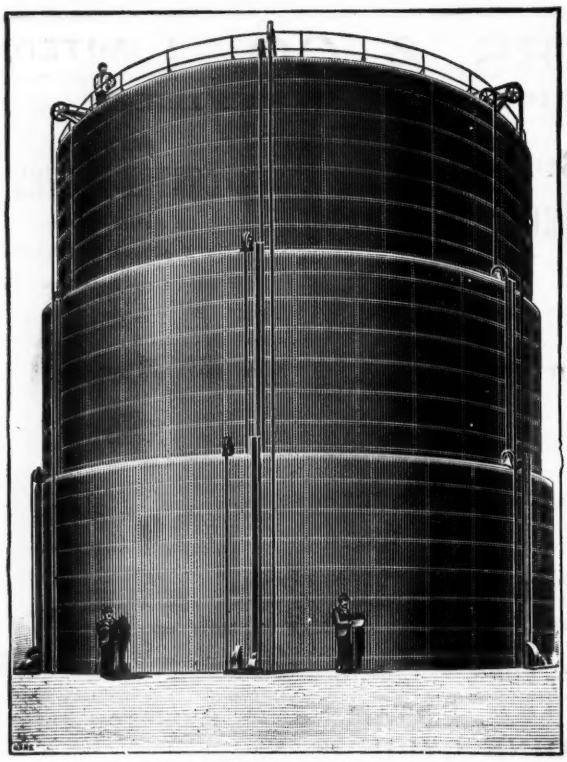

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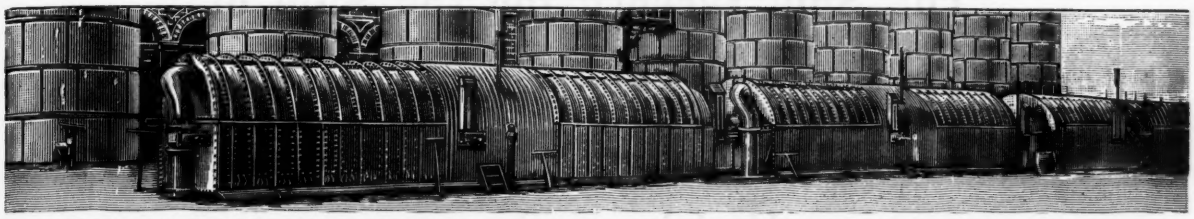

View of SIX PATENT "STANDARD" WASHER-SCRUBBERS, erected at the Beckton Station of The Gaslight and Coke Company (the Engines driving same being under Galvanized Iron Covers). This Company have 30 of these Machines in use. They are also in operation at a great number of Gas and other Works in this Country and Abroad.

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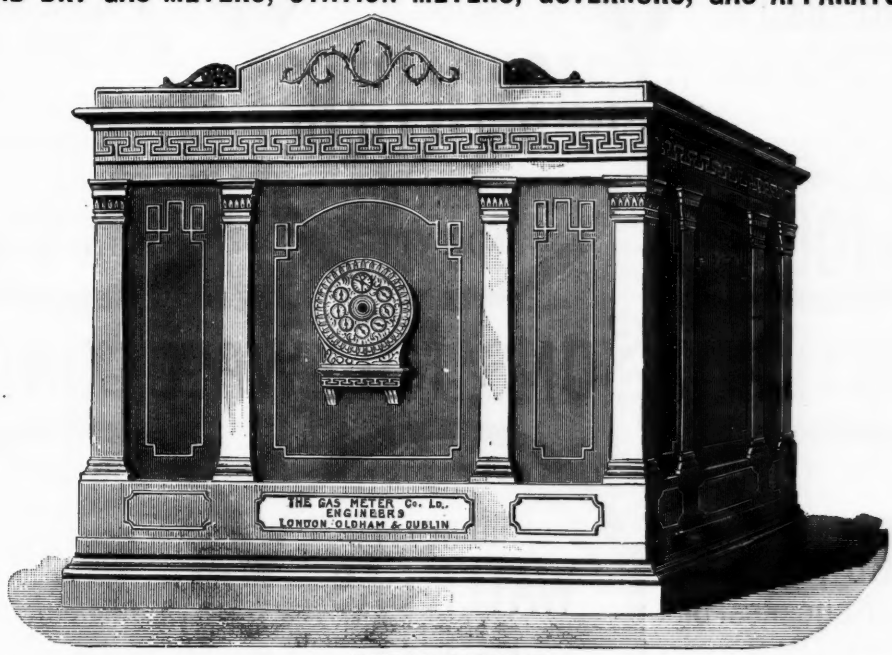

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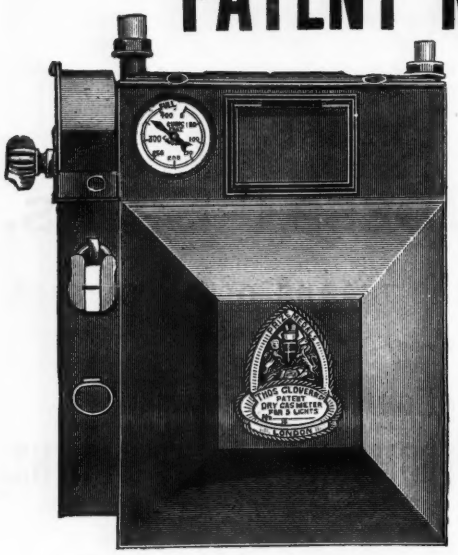

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[See also Advt. p. 868.

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EDITORIAL NOTES.

The Prospects of Improved Street Lighting for London.

IT would be a good thing if the passing interest in the important subject of the lighting of the streets of London that has been aroused by the recent proceedings in the London County Council respecting the lighting of the Thames Embankment, should have the result of leading to a reconsideration of the whole system by the principal Metropolitan authorities. The greatest hindrance to any complete and comprehensive reform of the London street lighting lies, as we point out elsewhere, in the subdivision of the duty among so many independent highway boards. The County Council have no authority over the lighting of any portion of the thoroughfares of the capital except the bridges and one or two special lines of new roadways, such as the Albert and Victoria Embankments, which are committed to their care by Acts of Parliament. Over the rest of London, the Corporation of the City, and outside the City the parish Vestries, have exactly the same rights and responsibilities in the matter of public lighting as appertain to all independent local authorities. So far as the Corporation are concerned, it must be acknowledged that the new streets made from time to time by this much-abused body are provided with neat and not inelegant gas-lamps and posts, placed, as a rule, quite thickly enough for all practical purposes. It is the ancient highways, and the new centres of market, postal, and newspaper traffic which are continually being created by the exigencies of the development of the business of the capital, that fare worst at the hands of the Corporation, as well as under Vestry management. It is an old story that the Corporation especially have preserved an attitude of indifference, if not of hostility, towards all suggestions for the improvement of the gas lighting of the City streets. Several successful experiments in this direction have been carried out for the edification of the City authorities; but not one of them has met with the official approval that its merits deserved. One after another, the improved sets of gas-lamps were removed from the City streets; and it was only when, after years of waiting, the City became possessed of an electric lighting service, that anything was done to remove the reproach of dinginess that clung to the streets. And then the work of improvement was set about with an irritating disregard of the real necessities of localities. The large and open thoroughfares which, crowded all day like the entrance to a beehive, are deserts by night, were provided with powerful lights for the delectation of the solitary policeman and the infrequent cab-driver; while the places where most night-work is carried on were left in primitive obscurity. The Corporation spent so much money upon their "fancy" arc lighting, that they would not afford an extra gas-lamp or a more liberal gas consumption where anybody could see it was sorely needed.

The position of the parochial authorities outside the City is peculiar. Once out of the City of London limits, proceeding westerly, one enters what is called the City of Westminster; and this is perhaps the busiest night city in the world. Yet there is no central municipality to look after the public lighting; but parish succeeds parish without visible boundaries. Every such parish has its own thickly-populated back regions to light and otherwise care for; but, in addition thereto, it has also more or less of arterial street-lines to maintain in all essentials, not for its own local purposes, but for the convenience of the whole world. Why should it do this? One reason may, no doubt, be found in the fact that it is the universal traffic that makes the rateable property bordering on, and in the vicinity of, the arterial streets so valuable as it is; so that as the parishes represented (say) by the Strand Board of Works, levy rates in proportion to the Imperial and cosmopolitan character of the great thoroughfare from which the Board take their corporate title, they must perform suitable services in return. Still it is incontestable that the street lighting of the capital of the British Empire partakes of the character of everybody's business; and its quality suffers accordingly.

It may be confidently hoped, however, that better things are in store in respect of London street illumination. The glamour that has surrounded electric lighting these many years past is beginning to disappear before the influences of familiarity and the revival of confidence in the permanence of the gas industry. It was impossible for urban

local authorities, constituted as they are, to trouble themselves overmuch about the improvement of the public lighting service in connection with a system which all the fuglemen of public opinion were agreed in describing as moribund. Here and there energetic gas engineers succeeded in forcing improved gas-lamps upon the public notice; but the results they achieved were necessarily of a sporadic character, and could not make much headway against the prevailing drift of public opinion. People looked for the electric light, and they would not look at gas, in more than one sense; and now they know more about the whole matter. The new system of public and private lighting is no longer a novelty. It has come among us "to stay," as the catch phrase has it; and nobody wishes to drive it away—least of all gas engineers, to whom its presence has given an opportunity and an impulse unknown before its advent. To the public in general, however, the word "electricity" is no longer the conjuring name it once was. It still covers a multitude of shortcomings, and induces a relaxation of purse-strings impossible to be effected by any other agency; but it does not blind the public eye to the existence of different means of performing service to the community. So gas is gradually coming to its own again, on its merits; and electric lighting is also being put upon its merits, which is a good thing for both systems. We ask for nothing more; and the public are showing signs of not being willing to rest content with anything less. So far as the lighting of the streets of London is concerned, a reformed municipal disposition may ere long remove the initial obstacle to improvement; but when the London County Council admit that gas is still to be reckoned with for this service, there is much ground for hoping that a mischievous illusion will speedily be cleared away.

The South Metropolitan Accounts.

Last week we published the report of the Directors of the South Metropolitan Gas Company upon the past half year's work of the undertaking; and in another column we now reproduce the statement of accounts referred to in the report. They are of a highly satisfactory character. Notwithstanding the remarkable increase of 13 per cent. in the gas consumption, the expenditure of capital upon new buildings and plant in extension of works is only £4396, while upwards of £34,000 has been spent in providing new and additional mains and services, meters, and stoves. The South Metropolitan Directors certainly know how to take care of their capital. In the revenue account, it is shown that the gas-rental amounted to £427,049, as compared with £384,771 for the corresponding half of 1894, with gas 1d. per 1000 cubic feet dearer up to Lady-day. The accounts now state the numbers of the Company's meters and stoves at rent; distinguishing between the "ordinary" and "automatic" classes. It is worthy of notice that already the number of automatic meters is nearly half of that representing the older connection; and that whereas the Company have 27,120 ordinary stoves at rent, there are already 20,817 stoves on the automatic system. Residuals returned £167,196, as against £171,611, though larger quantities had to be disposed of. Coals and enrichment cost £223,528, as against £189,424. Wages (carbonizing) cost £49,437, which works out to 2s. 5d. per ton. Altogether, the cost of gas manufacture amounted to £363,479, as compared with £317,254 for the June half of 1894. In the charges for gas distribution, the new entry for "gas-fittings (labour)" again appears. This is for the equipment of artizans' dwellings under the Company's gas-popularizing system. Rates and taxes show a small increase. There are no law charges; and bad debts are somewhat largely diminished—two highly satisfactory points. The balance carried to the net revenue account is £177,002. At the same time last year it was £186,920. By the carbonizing accounts, it appears that during the half year the Company returned in a certain degree to the use of cannel, besides employing a great deal of petroleum spirit. There seems to have been some little difficulty in keeping up the illuminating power. The quantity of unaccounted-for gas went up from 171,490,000 to 207,461,000 cubic feet, which is about the least gratifying entry in the accounts under notice. The unaccounted-for gas is less than 5 per cent. of the output; but the troublesome consideration about it is that the actual gross waste is greater. Moreover, there was an increased "use" of gas on the works, which mostly means loss. In the balance-sheet, the amount of workmen's bonus and savings deposited with the Company stands at £41,212. This is worth more than any reserve fund of equal amount. No less than £25,680 is entered as due to the Company for automatic gas-fittings. There is not a great deal in these accounts for the Chairman to explain to-morrow; but he will have plenty of other matter in which to interest the proprietors, as we indicated last week.

The Gas Supply of Glasgow.

The condition of the gas undertaking of the Glasgow Corporation is fully revealed by the facts and figures reproduced in another column. It cannot be too often repeated that this great undertaking is administered upon the only sound principles of municipal supply enterprise. It stands quite independently of corporation finance—paying its own way, and giving to the citizens the utmost benefit obtainable from current industrial and commercial circumstances. Speaking broadly, if all municipal gas departments were worked as is this of Glasgow, there would be little objection to the disappearance of every gas company in the United Kingdom, and the municipalization of all the undertakings. The Glasgow Gas Committee have brought the price of gas down to 2s. 4d. per 1000 cubic feet; and it must continue to fall, other things being equal, as the capital burden upon the undertaking is reduced. The Committee treat their people well, and conduct all their affairs with a high degree of practical wisdom. There is no inducement to adulterate the Glasgow gas supply with politics, to "sweat" the undertaking in the interest of extravagant and incompetent spending departments of the Corporation, or to tyrannize over outlying contributory districts. It is only necessary to recall to remembrance the names of some half-dozen notorious municipalities to comprehend the character of the eminence on which the Glasgow Gas Department stands in these respects. Nor is it difficult to trace the source of most of the difference in this regard between Glasgow and those places. The personality of the ruling authorities goes for a great deal, of course; but it is not necessary to assume that Glasgow people naturally possess less original sin and more wisdom than the others. The chief consideration is the fundamental difference between Scottish and English municipal gas polity. Most unfortunately, as the event has abundantly proved, English municipalities, as a rule, have been permitted to exploit their gas undertakings for the benefit of the local rate fund. In Scotland this is not permitted. And now we can see the consequences of the operation of these principles. Unhappily for themselves, English municipalities owning gas property have been placed between two conflicting interests; and in too many instances the best men belonging to these bodies have become so moulded to their environment as to be unable to perceive rights from wrongs. How are such men to do justice to the gas undertaking, to the consumers (and through them to the local industry and commerce), to their employees of all grades, and at the same time wring the last penny out of the concern to subsidize the rates withal? Recent parliamentary decisions go to indicate that this subsidizing process is likely to be brought under stricter regulation than was deemed necessary in the case of English municipalities; but in Scotland the gas-works are happily put beyond the reach of this mischief. There is nothing very remarkable about the Glasgow report and accounts for the past year. It may be noticed as curious that the twelvemonth's figures in this instance do not very greatly differ in scale from the half-year's return in the case of the South Metropolitan Company, whereby some interesting parallels are suggested.

The Incandescent Gas-Light System.

It seems very likely that within a brief period the fortunes of the incandescent gas lighting system in this country will exhibit a great change. The proprietors of the Welsbach patents and of others that have been taken out to cover them, according to the usual practice in such cases, are being threatened with rivalry on all sides. Of course, we do not propose to raise any question whatever as to the validity of the weapons of either side in this impending conflict; but it is pretty obvious that the Welsbach property is just now in jeopardy. It is impossible to say how many lawsuits there are at the present moment in progress in the chief manufacturing countries of Europe

to determine the issue of whether the Welsbach patents are good or bad; but it is certain that the number is large—perhaps larger than has ever been known in regard to a similar issue. This circumstance shows the estimation in which the prospects of incandescent gas lighting are held in this part of the world. Curiously enough, the multitudinous assailants of the Welsbach monopoly do not appear to realize what would be the effect upon the whole trade of the success of any one of the litigants who are attempting to destroy it. The fact of the Welsbach Company being able to command for their productions a price altogether superior to the ordinary commercial value of such articles, has been the principal attraction for the alleged infringers to enter the field; but this excess price is simply the benefit derived by the Company from their patent right. The moment this is taken away, the Company will cut their selling price to the bare commercial margin; and as they have been strengthening their position in every way during the last few years of plenty, it will be their own fault if they are not able to cut the margin closer than any rival with a connection to make. How much profit will remain in the business for all those who will be in it if it is thrown open, is a question easier to ask than to answer. Whenever this stage in the development of the system is reached—whether this happens next term or in a few years' time, as Fate and the fortune of the Welsbach Company may determine—the gas industry will find itself in possession of a variety of burners selling at a shilling or so apiece, and developing a duty which a few years ago would have been regarded as fabulous. This is the prospect which the rivals of the gas industry will have to face, sooner or later, as we have already had occasion to observe in an earlier issue. The fortunes of particular trading companies are nothing to us; but the future of the incandescent gas-light, as a principle, is a very great subject of consideration for everybody concerned with the gas industry. The value of the principle has been established; but there is plenty of room for improvement in the methods of applying that principle for common use in lighting.

No Legal Right to Air.

A REMARKABLE lawsuit was recently decided on appeal by Lords Justices Lindley, Lopes, and Kay, in which the "bone of contention" was a presumed right to air. The case first came before Mr. Justice Cave, at the Exeter Assizes, when a perpetual injunction was granted restraining the defendant from so raising a building upon his own land as to interfere with the access of air to the house next door. No such decision had ever been given in a Court of Law in a matter of the kind; and the Judge's declaration that the plaintiffs had a right to the passage of air coming over the defendant's property to them was such an important extension of the law relating to lights, that it is satisfactory to know that the matter was not allowed to rest as he left it. It is evident that, if such an interpretation of the law were to hold good, enormous difficulties would be put in the way of any freeholder who might have occasion to erect a lofty structure, such as a gasholder, upon his own land. The judgment of the Court of Appeal, however, was adverse to Mr. Justice Cave's decision; and the injunction was accordingly dissolved with costs. The opinions expressed by the Lords Justices on the issue were very clear, and, it may be added, reasonable. It had been argued that the defendant's new buildings interfered with the natural ventilation of the adjoining premises, and this was not denied; but Lord Justice Lopes, for himself and Lord Justice Lindley, laid it down that, while every man has a natural right to enjoy fresh and pure air, so that whoever sends noxious vapours or foul air into his neighbour's premises ought to be restrained, the Court could not impose upon his neighbour the obligation to keep away noxious smells. It was contended that, irrespective of any nuisance, the plaintiffs had a right to the free passage of air over and above their premises, and to have every disagreeable smell carried away by the current of air that would pass over the premises. It was held, however, that, inasmuch as there was nothing to prevent the defendant from building on his own land, such a right as was sought to be set up could not be supported, and that a man is not bound to see that his neighbour has proper ventilation. Lord Justice Lindley further remarked, in view of the importance of the case, that no one has a right to complain of his neighbour building on his own land, even though it might diminish the flow of air on the land adjoining, unless there was an immemorial right to the user, or an agreement binding the owner not to build. Thus what might have proved a fruitful source of vexatious lawsuits has happily been removed. The law of "ancient lights" is troublesome enough on occasion; but a right to ancient natural ventilation would have lent itself to intolerable abuse.

WATER AND SANITARY AFFAIRS.

ONE of the most striking incidents connected with the recent history of the East London water supply is to be found in the visit paid to the East-end last week by Mr. Chaplin, the President of the Local Government Board, who sought thus, by personal inspection, to satisfy himself as to the facts of the case. It were much to be wished that this "come and see" principle were more generally adopted by imperial and other authorities, who form conclusions founded on report, and on a distant view of facts which can only be rightly estimated by a process of close examination. Mr. Chaplin found the East-end neither so dry nor so dirty as common report would make it appear. There was water, and there was also soap, for it seemed to be a general washing-day. The part visited was St. George's-in-the-East, which may be described as the very antithesis of St. George's, Hanover Square. But cleanliness was by no means an absent virtue, even among Poles, Germans, and Jews. This would imply that water was not altogether deficient; and it is stated that, at the time of Mr. Chaplin's visit, the "famine," so far as it ever existed, was "a thing of the past." It is further stated that "there were practically no "complaints." One must go to the Vestries and to Mr. Kyffin to hear anything of these. One feature which probably impressed itself on Mr. Chaplin was the "utter "absence of any system of domestic storage of water." This is the weak link in the chain of constant supply; and it has been the immediate cause of the late trouble. Additional value was given to Mr. Chaplin's visit by the circumstance that he was accompanied by Sir Hugh Owen and Major-General Scott, and was met on the ground by several of the local officials, as well as by Mr. Bryan, the Engineer of the East London Water Company, together with some of his staff. Much has been said of a great increase in the mortality where the water supply has been deficient. But there is the fact that the death-rate of the area served by the East London Company has not risen during the period of the intermittent supply. The inspection is said to have left an impression that a drought protracted much longer than that which has happily come to an end "might bring about an exceedingly serious "crisis, and one which might demand extraordinary "remedies." But the contingency has passed away, and is not likely to repeat itself. "We can only live in "hope," says the account in *The Times*, "that no further "drought may come until the new storage works are "completed." All will not be ready at once; but enough will be finished by next May to secure the safety of the population until further progress can be made.

We referred last week to the admirable letter in which the Directors of the East London Company, through their Secretary, Mr. Crookenden, had replied to the interrogative communication which they had received from the London County Council. A plain array of facts is thus adduced in proof that the Council are responsible for the late deficiency in the supply of water to the Company's district. The Directors state that the Council, "in pursuance of their avowed hostility to the Water "Companies, thought fit to do their best to wreck the "measure of 1893, on its second reading in Parliament. "They succeeded; and the public are suffering accord-"ingly." A remarkable confirmation of the truth of the charge brought against the Council by the East London Directors, is afforded by a letter which appears in *The Times* from Mr. R. A. Read, jun., a solicitor who was engaged in the opposition to the Bill of 1893. This gentleman, writing from Parliament Street, deals with the argument held by Mr. Cripps, that the Council are not responsible for the insufficient supply of water, seeing that they offered, on certain conditions, that the Bill should be allowed to "pass" unopposed. "With great respect to Mr. Cripps,"

Mr. Read contends it is "idle" for that authority to say: "We are not responsible because we offered you the Bill "in a certain form." Mr. Read rejoins by saying that the Company, as promoters, were right in introducing the Bill in the form they considered necessary for their purposes. He pleads for the direct responsibility of promoters to Parliament, not to opponents. In this case, Parliament, influenced by the County Council, rejected the Bill on the second reading, so that it never reached Committee, and no evidence was given on either side. On this ground, Mr. Read pronounces the Council "responsible, so far as the parliamentary proceedings of "1893 affect the question, for the delay in taking up "works which now would appear to have been necessary." Such a declaration from a professional opponent of the measure, carries with it especial weight. But there is yet further evidence on the point, in the shape of a letter from Messrs. Bircham and Co., the Solicitors to the East London Company. We have thus evidence from both sides, leading to the same conclusion. Messrs. Bircham meet the allegation of Mr. Cripps, that "there was no opposition "on the part of the Council to the Company making "additional works." The distinct rejoinder is made that "this statement is not correct;" and the Solicitors for the Company go on to say: "(1) That the Council did oppose "the additional works. (2) That the clause imposing the "arbitrary restrictions [on the consumers] was withdrawn "by the Company, and was not treated as a ground of "opposition by the Council. (3) That the offer to with-"draw the opposition was made conditional on the Com-"pany abandoning the capital for the storage reservoirs "and pumping machinery." The facts brought forward fully demonstrate the accuracy of these statements; and nothing could more completely show that the Council actually opposed the construction of works which would have prevented the recent dearth of water in East London. Evidence to this effect comes in on every hand; and it is marvellous that the Council should attempt to disown the part which they have so palpably taken in opposition to the proposed works, and for which opposition they have claimed credit in the past.

A second article from "Our Special Correspondent" has appeared in the columns of *The Times*, on "The Water "Supply in East London." The writer declares that the Company are not to blame for being "too late with the "additional storage." The County Council opposed the Bill of 1893 on the plea that the proposed works were unnecessary. The Special Correspondent says on this point: "The facts of the present emergency, however, "prove the contrary beyond the possibility of denial." The Council are accused of making "a very great "blunder;" and it is remarked, therefore, that the present Council show "no little hardihood in venturing to take the "Water Company to task, and particularly in suggesting "that the Council's Engineer should come to the rescue of "Mr. Bryan." After dealing with some other parts of the question, and remarking that "we have clearly gone too "far in abolishing cisterns," the writer concludes by saying: "Finally, public confidence in the London County "Council as a possible substitute for the Water Companies "has not been increased by this striking exposure of its "capacity for blundering."

The biassed and bitter attitude of the Press towards the London Water Companies has so often been the subject of notice in the JOURNAL, that it is positively refreshing to be able to refer to journalistic comment of a juster character. The *Morning Post*, in a leading article, has taken a line on this question which affords a notable contrast to the unfair and impulsive methods of some of its contemporaries. Referring to the persistent opposition of the County Council, the writer of the article in question touches in particular upon the facts connected with the defeat of the East London Company's Bill in 1893, and proceeds to declare that it is plain that the action of the Council in 1893 and 1894 was dictated by the persistent policy of the Progressives to wage an irreconcilable war against the Companies. Our contemporary says truly that the Council's avowed object has been to "depreciate the "Companies materially and morally. In the particular "course they pursued with reference to the Bills of the East "London Water Company, it is patent that they were more "anxious to prevent an increase in the assets of that under-"taking than to safeguard the health and comfort of the "consumers." This is a statement of unusual frankness; and, as we have just said, it is absolutely well founded. The onslaught on the East London Company's Bill was simply a move in party politics, of the probable results of which, already experienced at the East-end, the then Chairman of Committees expressly warned the House of Commons. Is it not time, asks the *Morning Post*, for the Progressives to abandon this attitude of reckless and indiscriminate hostility? And is it not time, we, for our part, may ask, for the Press to follow the example of our contemporary, and teach the Progressives a saner policy? After all, it would be little more than making a virtue of necessity; for experience shows that the former tactics of the party referred to were absolutely mistaken. The decision of Mr. Plunket's Committee has made it abundantly clear that Parliament will never sanction the compulsory purchase of the water undertakings by the Council on terms of a confiscatory character. While uttering this warning to the restless spirits of the County Council, the *Morning Post* also makes an appeal to the Companies—urging them to formulate proposals either for a fair purchase or for such modifications of their statutory powers and for such a measure of public control as would put an end to the present injurious strife between the water interest and a public authority. Of the spirit of this suggestion, no one can complain; but it is to be feared that the appetite of the irreconcilables could not thus easily be appeased. Nothing that the Companies, with a due sense of what is owing to their shareholders, might propose, would be likely to commend itself as a "fair" basis to the rapacious county councillor. But, then, it is true that, for the time being, this particular type of councillor is not in the ascendant. If the householders who have changed the balance of parties have made up their minds that any purchase of the water undertakings must be on equitable terms to the present proprietors, and that the controlling authority of the future must not be the County Council, then, indeed, the prospects arising from a renewal of negotiations will not be without some elements of encouragement.

It was with considerable hesitation that Mr. Justice Cave gave judgment in favour of the consumer who has been in litigation with the Southwark and Vauxhall Water Company on the question of what constitutes an efficient waste-preventing apparatus. The point turned on the construction of regulation No. 21 made by the Board of Trade pursuant to the Metropolis Water Act, 1871, which requires every water-closet to have an efficient waste-preventing apparatus so constituted as not to be capable of discharging more than a specified quantity, unless it be deliberately made to do so. The case originally came before a Police Magistrate, who decided against the Company, though on grounds which Mr. Justice Cave did not adopt. If there had been any evidence of the existence of a nail or a hook by which the chain could be fastened down, or of any weight attached to the chain so as to hold it down, the learned Judge would have ruled that the consumer had violated the regulation, and rendered himself liable to a penalty. But, in the absence of such evidence, his Lordship (with whom Mr. Justice Lawrance concurred) considered that the fact that a little water escaped in excess of the two gallons when the chain was held down by the hand was not enough to bring the case within the scope of the regulation. It may be questioned, however, whether this is not a rather dangerous application of the maxim "*De minimis non curat lex*," inasmuch as "a little water" escaping on one occasion in the manner suggested means a great deal of water when the occasion or the possibility is multiplied by the number of days in the year, the number of persons in one house, and the number of consumers in a vast area of water supply.

Mr. G. J. Roberts, who was for 35 years in the service of the Dover Gas Company, and for many years filled the position of Indoor Manager, died recently in his 68th year, after a very brief illness.

The Management of the Grantham Gas-Works.—Mr. W. Barratt is retiring from the post of Manager of the Grantham Gas Company on account of the unsatisfactory state of his health. In their half-yearly report, the Directors acknowledge that, for 21 years, he has served the Company faithfully and well, and has placed the concern in its present sound condition. The Company will not entirely lose his services, as arrangements have been made by which he will now act as Consulting Engineer. Mr. R. G. Shadbolt, the Manager of the Low Moor Gas-Works, has been appointed to succeed Mr. Barratt.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 357.)

With the reopening of the Stock Exchange on Tuesday after the Bank Holiday, business was resumed with a fair degree of activity, all things considered. But this rate of going did not increase as the week progressed; but rather tended to relapse into considerable quietude. Prices on the whole did not effect any marked change, but remained pretty steady. A good deal of speculative operating in South Africans made them lively as an exception; while, on the other hand, home railways were about the weakest, owing to bad weather and poor prospects. The Money Market showed no change, nor any prospect of a change. Business in Gas stocks was a very fair average for the time of year; and, although one big issue had a slight relapse, the general tone showed no abatement in public favour, and several nice advances were made in the quotations. The general advance, however, was dwarfed by the great stride effected by Gaslight "A," which opened at 293½, and closed at the "record" figure of 300. Nothing at all was done in any of the secured issues. But all the 10 per cent. preferences rose freely; and the 4 per cent. debenture improved a point. South Metropolitans were a quiet market; but very strong—the "B" touching 310. Commercials were firm and unchanged. Very little business was done in the Suburban and Provincial division. But high prices were readily obtained; and the quotation of Alliance and Dublin was advanced. There was not much doing in the Continentals, except Imperial, and that underwent a slight relapse; but European and Union were very firm. Among the rest, the only noteworthy point was the further recovery in Buenos Ayres issues. The Water Companies were almost stagnant; and the only change was a good rise in West Middlesex. Kent meet to-morrow to declare their 12 per cent. dividend, which suffers no abatement from the great frost.

The daily operations were: The Gas market re-opened very bright and buoyant on Tuesday; and though transactions were not very numerous, some capital prices were obtained. Gaslight "A" advanced 1½; and ditto 4 per cent. debenture, 1; Alliance and Dublin, ¼; Buenos Ayres, ¼; and ditto debenture, 1; but Imperial Continental fell 2. Business on Wednesday was about the same pitch; and prices were equally strong. All the Gaslight 10 per cent. preferences rose 3 each. Thursday's transactions were a little quieter. But there was no abatement of values generally; while Gaslight "A" advanced another point. In Water, West Middlesex rose 2. The condition of the market on Friday was much about the same, with excellent prices. South Metropolitan "B" advanced 3; and Alliance and Dublin, ½. West Middlesex Water had a further rise of 2. Saturday was the most conspicuous day, when Gaslight "A" took a big jump of 5 more; and for the first time the stock changed hands at the great price of 300.

ELECTRIC LIGHTING MEMORANDA.

The Proposed Lighting of the Thames Embankment—The Common Sense of Street Lighting—The Electric Light in Manchester—Transfer of the Liverpool Electric Light Undertaking.

A good deal of interest has been aroused by the recent proceedings of the London County Council in regard to the lighting of the Victoria Embankment, which have drawn attention to the generally poor lighting of the streets of London. The absurdity of the proposal to set up a costly independent electricity supply station for this particular service has struck everybody but the Progressive party in the Council, with whom it originated; and the estimated working expenses of the proposed system of arc lighting have induced several newspaper writers to pay increased respect to the known cheapness of gas. With regard to the larger question of the better lighting of the main thoroughfares of the Metropolis, which is recognized to be much more needed than a show illumination of the Embankment, only the *Engineer* seems to have hit upon the principal obstacle in the way of improvement, which is the absence of any united highway authority for London. The Metropolitan Board of Works was originally created to deal with a variety of matters, such as the main drainage, in which London as a whole is interested; but the care of the main roads, including their lighting, was still left to the Vestries and other local bodies through whose districts these arteries of traffic pass. Our engineering contemporary suggests that "some central fund should be used to assist Vestries to improve the lighting of their more important streets;" and it is not to be doubted that some radical alteration of the system of main thoroughfare administration must precede the improvement of the principal streets in this and other respects.

The difficulty in getting a question of street lighting reasonably settled is the uncertainty that prevails among members of highway boards as to where to look for trustworthy guidance in the solution of problems of the kind. The debate in the London County Council which ended in the adoption of a motion referring the question of the Embankment lighting back to the Committee for further inquiry of the nature already reported in this column, was a remarkable illustration of the way in which a sensible resolution may be the outcome of an unintelligent and rambling discussion. One honourable gentleman spoke on this occasion because he often strolled along the Embankment, and liked the existing lighting; while another had a say because he was more interested in other thoroughfares. Hardly one of the unofficial speakers gave, in his remarks, evidence of having looked into the question much more carefully than "the man in the street;" and yet, on the whole, the Council came to a decision of which even the electrical journals approve. Now, the man in the street very often manages to form correct opinions regarding matters brought within his cognizance; and his objection, shared by the County Council, to the spoiling of the Embankment for the sake of giving electricians another job, is eminently creditable to his taste and common sense. It would never do to trust to either of these qualities in the case of an electrical expert. Immediately after the County Council debate, the *Electrical Review* published, "with a view to aid the Council in its deliberations," a view of the Embankment showing arc lamps and an electric tramcar, with trolley wires, in the middle of the roadway. This illustration was described as proving that "neither the arc lamp standards nor the electric tramcar interfere in the slightest degree with the beauty of the surroundings." As somebody was made to observe in a popular play, "a man who will say that will say anything."

The Gas and Electric Light Committee of the Manchester Corporation have reported to the City Council upon the working of the electric light undertaking for the past municipal year. The installation has done well, and received increasing support; the total revenue for the year amounting to £28,640. The cost of generation, distribution, and management was under £11,000; the cost on capital account was £7938; and £4000 was transferred to renewals account. There was thus left a profit balance of £5709; and finding themselves for the first time in funds, the Committee promptly decided to hand over a subsidy of £5140 to the city treasury in aid of the rates. Thus the newest of the commercial undertakings of the Manchester Corporation is made to share the same fate as the oldest, of conversion into an agency for the indirect taxation of the community. Additional plant, to cost £100,000, is to be laid down forthwith to cope with the growing business of the department. The price of the unit has been reduced from 8d. to 6d.; and a largely increased consumption of electricity at the cheaper rate is anticipated. The St. Pancras Vestry might with advantage note the circumstance that in Manchester it has not been deemed necessary to strangle hydraulic power distribution in order to give the Electric Lighting Department a chance.

The City Council of Liverpool, as will be seen from a report in another column, have adopted the proposals of the Electric Lighting Committee for the acquisition by the City of the undertaking of the local Electric Supply Company. The agreed transfer price is £400,000, with which the parties to the bargain profess to be equally satisfied. The share capital of the Company is £250,000, besides an additional sum of £16,000 expended upon capital account; and the shareholders have received 6 per cent. dividends since June last year. There is no getting over the fact that the Corporation are paying a heavy premium to the Company for having been first in the field; and this consideration seems to greatly trouble some members of the Corporation. On the other hand, if the City wants the property, it can only be had for such a price as the owners are willing to accept. The partisans of the municipalization of everything usually argue as though the moment an undertaking can be shown to be worth anything, the local authority should be empowered to acquire it upon their own terms. The case of the Liverpool electric light undertaking will serve to show that this notion of the "divine right" of municipalities to expropriate the adventurers in new enterprises the moment they succeed in bringing their business into a prosperous state, does not work in practice. We shall not discuss here the delicate question of whether or not the Liverpool electric supply undertaking is worth the price at which it is to change hands.

THE RIGHT AND WRONG OF INVENTING.

At the opening meeting for the past session of the Institution of Junior Engineers, Mr. Alexander Siemens, the President, delivered an Inaugural Address which was briefly mentioned in the Journal at the time. We now desire to return to the consideration of Mr. Siemens's remarks on that occasion, with more particular reference to those which he addressed to the subject of inventions and inventors, because they are in the highest degree instructive, and should be reported far and wide for the benefit of that very large section of the community which dabbles in patents. There is no subject of general interest to civilized humanity—not even political economy—in regard to which erroneous opinions are more generally rampant than that of inventions and inventors. We are specially concerned to spread the truth in reference to this subject, because the gas industry is peculiarly afflicted with inventions of a mischievous kind, as our volumes abundantly record; and large sums of money are continually being wasted, and valuable time thrown away, upon the exploitation of "wild cat" patent gas schemes which crumble at the first touch of an experienced hand. It is impossible for a technical journalist to get at the multitudinous

fools who constitute the never-failing support of the schemers of all lands; for the simple reason that these people never look into any of the authorities upon the art or industry which they fancy themselves commissioned to improve. But we can at least make an attempt to reach those young aspirants to gas engineering knowledge and experience who are liable, either in their own persons or on behalf of others, to be carried away by the inventor's mania. It is precisely these young "hopefuls" Mr. Siemens had in view when he observed that "the success which has attended the efforts of many inventors, and the constantly widening field for the utilization of natural forces, exert an ever-increasing fascination over our imagination; and when a young engineer enters practical life, it is not to be wondered at if he dreams of the improvements he may introduce, and of the reward he will earn for his ingenuity." This is an eminently right and proper spirit, as the speaker went on to admit, with which to enter upon one's life-work; for all true progress proceeds from genuine enthusiasm and proper self-confidence, enabling men to bring to their studies that earnestness and thoroughness without which no real advancement is possible.

The point to be specially noted here is that this enthusiasm and proper self-confidence are to be applied to studies. That is just what the popular fallacy prevalent on the subject, and encouraged by certain predatory patent agents, does not admit to be the necessary preparation for successful invention. As Mr. Siemens said, upon this head: "It is a popular superstition that inventors are heaven-made, and that they can produce useful novelties to order in any branch of manufacture where a want exists, if only their attention is drawn to it." In illustration of his teaching, Mr. Siemens mentioned the popular legend of Watt and the kettle, in which an accidental observation is supposed to have straightway suggested the steam-engine. The truth of the matter, which is ignored in the popular version of this story, is that Watt made himself thoroughly well acquainted with all that had been done before; and then he had to work hard before he brought his invention to a successful issue. Hence, said Mr. Siemens, "we may generally say that, in order to approach a problem with the most certain prospect of success, it is necessary (1) to define, as accurately as possible, the want that exists, or the particular object that is to be attained; (2) to be well acquainted with the scientific principles that come into play; (3) to know how the want is met, or the object attained in practical life; and (4) to find out what proposals have been made by others in the same or in a similar case." Mr. Siemens went on to describe several leading inventions. He also gave a sketch of the trials and vicissitudes of their authors, which led up to the lesson he wished to convey—that the advancement of any industry is most hopefully attempted by those who have learnt all about it and are expert practitioners of it; and, conversely, that those people have the worst chance in the race who are not well acquainted with the branch of industry in which they wish to introduce improvements, and who do not study the technical literature bearing on the subject. Yet this latter class of people are precisely those who clamour for cheap patents, and who inundate the Patent Office with their so-called inventions.

Nobody who has had the smallest experience of Patent Office business can fail to agree with the truth of Mr. Siemens's description of the common or "heaven-sent" inventor, as a man who ignores everything and everybody, and scorns all science that does not square with his own crude notions. Summing up the moral of several entertaining stories relating to the projects of persons of this class which had come under his personal observation, Mr. Siemens said it is certain "that a numerous class of people exist who are under the impression that they can advance a branch of industry by suggesting ideas that are plausible to them, quite irrespective of existing experience or of natural laws. As a rule, very little is heard of them in public, because these ideas are seldom of any value. But if by chance an outsider makes a useful suggestion, the most is made of it, and the example is quoted by everybody as a proof that special knowledge is by no means required." The truth is that for one "outsider" who makes a happy hit with an industrial invention, or even with a patent of the extensive class known as "notions"—to produce which no mechanical or scientific training is necessary—thousands of patentees fail, and lose money, time, and heart for honest work of any kind.

Having done our best to repeat and lay stress upon the sound doctrine of Mr. Siemens in this matter, we will proceed to show how the evil is spread. In a certain periodical conducted in the interest of a firm of patent attorneys, which purports to be "scientific," and is certainly "American," there recently appeared a brief article with the heading "Invent Something." It began with the assertion, ascribed to an unnamed "self-made millionaire," that "one of the best opportunities for a young man to make money quickly in these days is to rack his brains until he has invented something useful or that the public wants." Observe the idea—to get rich quickly, without work, by "inventing something." This guide, philosopher, and friend of youth went on to refer to an example. "You know how difficult it is to pick up small coins from a wooden counter. Yet the whole civilized world has growled at and endured it since coins were stamped and counters made, until the other day a young fellow invented a rubber mat with little bristles of rubber standing up thickly all over it. Coins thrown on the mat are as easily picked up as if they stood on edge. The public was quick to appreciate it; and *the inventor need not work for a living any longer.*" The italics are ours, and they are used for the purpose of giving full prominence to the grand ideal. Such advice is about as immoral in its tendency as the tales in sporting newspapers about the fortunes made by stable-boys by backing the right horses; and it is published with the same motive. We should like to hear what a real American inventor of the best type, such as Mr. Hiram S. Maxim, would say about this glorification of guesswork and its rewards.

Far be it from us, as it was from Mr. Siemens, to discourage young students of engineering from trying their hands at inventing, or even to hold up to ridicule the honest endeavours of people who may be mistaken, but who have worked in many instances hard and earnestly enough to deserve a better fate. We know by painful experience, however, that the greed of the outsider, and the covetousness of the hunter after "notions" that may strike the public fancy, are very apt to pass the narrow margin that separates the speculator—that is to say, the gambler—from the thief and the conscious impostor. Men who have followed a profession all their lives are, of course, not very likely to be taken by promises and professions of strangers with a "process;" but for younger gas managers there is an insidious temptation, to be guarded against, in the idea of being connected with something "progressive."

With regard to the attempts of young engineers to invent things, Mr. Siemens himself would probably approve of such enterprises on their part, provided they are not the outcome of presumptuous vanity and disinclination to search out the reasons for established practice. As a rule, however, youth is not the season of life when men create things that are worth creating. It is only when they are well past the student age that young men should venture to strike out fresh lines for themselves. Genius, of course, is above all rules; but geniuses are rare, and even more rarely to be envied. And when a man who knows what he is about deliberately sets his face towards the Patent Offices of the world, on his own account, he will be a fool if he thinks that this is the short and easy way to wealth and a life of laziness, as the American—unworthy of the name—whom we have quoted would imply. For, in truth, he who has an invention worth the attention of the technical world to bring out and perfect, has a long furrow to plough. The most successful inventions more often open out a life of hard work than a life of leisure for their authors. There is nothing the world resents more than improvement; and whoever presumes to set up for the instructor of his fellows is lucky if he escapes stoning. We do not care to speak here of the Stock Exchange variety of inventor. Sometimes a shrewd combination of the mechanician or chemist with the financier succeeds in exploiting himself and his inventions without having to endure the labours and pains of a probationary period. But such good fortune, again, is of the rarest. Once and for all, let it be said that whoever is attracted to the idea of "inventing something" as a way of becoming rich without labour or anxiety, in order to live happily and lazily ever after, had better take to the Turf or go to Monte Carlo instead, and so save himself from wasting his pains upon a peculiarly unpromising kind of speculation.

Mr. T. Glover, who has lately succeeded Mr. W. Littlewood as Manager of the West Bromwich Gas-Works, has received an addition of £50 per annum to his salary, with permission to reside away from the works, the situation of which has been found to considerably affect Mrs. Glover's health.

Sudden Death of Mr. T. Lightbody.—On the evening of the 5th inst., Mr. Thomas Lightbody, the Manager of the gas-works at Kilbarchan, Renfrewshire, died suddenly of heart disease. He had been in his usual health during the day. Mr. Lightbody was a native of Lanark, and settled in Kilbarchan 22 years ago. He was in his 67th year; and he leaves a large grown-up family of sons.

A Memento of The Gas Institute Excursion.—Our Scotch Correspondent writes: "I have been favoured by Mr. R. F. Hislop, of Paisley, with several snap-shot photographs which were taken by him on board the steamship *Glen Sannox*, on the occasion of the excursion of The Gas Institute in June last. They are excellent, and contain portraits of quite a number of well-known members of the Institute. They form a very pleasing remembrance of a very enjoyable event."

Presentation to Mr. H. Seagrave.—The position of Chief Accountant to the Sheffield Gas Company (which was recently advertised in the JOURNAL) has been secured by Mr. Herbert Seagrave, who, for nearly a quarter of a century, has been associated with the Gas Department of the Nottingham Corporation. His colleagues in the Accountant's offices would not allow this lengthened service to terminate without some tangible mark of their friendship; and accordingly last Friday week they presented Mr. Seagrave with a beautiful oak stationery cabinet. The gift was handed to him by Mr. W. Garton, who paid a high tribute to the zeal and ability with which he had discharged his duties. Mr. Seagrave thanked the contributors for their kindness, and remarked that he trusted his future business relations would be as cordial as those that had existed between the staff of the Nottingham Gas Department and himself.

NOTES.

Acetylene as a Standard of Light.

It is reported that M. Violle, the proposer of the so-called absolute platinum standard of light, has been engaged in a research with the object of ascertaining the capabilities of acetylene for furnishing a practicable standard of light. M. Violle claims to have succeeded in adapting the new illuminant to this purpose, by burning the acetylene under a somewhat high pressure in a burner to which air has free access, and which gives a flat flame. The light obtained in this way is described as very steady, brilliant, and white. Before the flame of acetylene, M. Violle places a screen, pierced with an opening of a given size; and in this way he thinks that he has obtained a standard of light which for constancy, whiteness, and brilliancy is comparable to his absolute platinum standard, and which, he considers, ought to make a safe and convenient secondary standard. Our information respecting these proceedings of M. Violle is derived from the *Electrician*, which does not give the original authority. As it is quite possible that M. Violle's new proposal may be hailed, like his former one, as a triumph for French science, it will not be superfluous to point out that the method followed by him for burning acetylene in air was first used and described by Professor V. B. Lewes, and that the adoption of a perforated screen to convert the flame so produced into a standard of light is simply the Methven principle. Given an acetylene flame and a Methven screen, and the suggestion for combining these elements into a standard of light does not call for much originality. Nor does it appear that the correlation of the value of such a standard to that of the futile platinum standard adds anything to its intrinsic worth.

Cox's Pipe Computers.

An ingenious device calculated to be of use to gas engineers has been patented by Mr. William Cox, of Stapleton, New York. It is called a gas-flow computer, and is a mechanical aid to the solution of problems relating to the flow of gas in horizontal mains. The construction is based upon Dr. Pole's well-known formula—namely discharge in cubic feet per hour $= 1350 \sqrt{\frac{\text{diam.}^5 \times \text{pressure}}{\text{sp. gr.} \times \text{length}}}$; where the pipe diameter is taken in inches, the pressure in inches of water, the length in yards and the specific gravity refers to air as unity. The formula is tedious to work out, especially when it is transposed for the purpose of ascertaining a suitable diameter of pipe for a given discharge. Cox's computer not only solves immediately either of these aspects of the problem, but also shows at a glance the effect of the smallest modification of either the pressure or the specific gravity of the gas; so that the most suitable combination of all the factors entering into any problem of the kind is at once ascertainable. The instrument consists of a foundation plate, with a graduated outer circle or dial, within which a disc, similarly graduated on its outer edge, revolves on a common centre. The graduations are scales of discharge and pipe diameter respectively—both covering a wide range of values. At the bottom of the instrument there is also a short moveable arc, having the same centre as the disc, bearing scales referring to the other factors of the problem; and the whole is so arranged that, by revolving the disc and combining certain divisions or quantities of any four scales, the resulting value of the fifth quantity appears. The appliance is mounted on a board, measuring 12 inches by 14 inches, and provided with brass swivels and nuts for locking the disc and arc in any desired position. Briefly, therefore, the instrument can be described as a means for showing at a glance the discharge of gas from pipes of from 1 to 48 inches diameter, and from 10 to 10,000 yards long, for any pressure from 0·7 to 4 inches of water, and any specific gravity from ·40 to 1·00. When the required discharge and the length of pipe are given, the diameter corresponding to any pressure is shown; and when the required discharge and the length of pipe are given, the pressure corresponding to any diameter is disclosed. A separate scale, called a "section scale," is also provided, by means of which the diminished pressure and the increased discharge are at once ascertained, when the gas is distributed in equal quantities at two, three, four, or any given number of equally distant points along a line of pipe, as in the case of street connections. Another form of the instrument is made for water-pipe computations.

The Comparative Cost of Hydraulic and Electric Power.

At the recent meeting in Glasgow of the Institution of Mechanical Engineers, Mr. E. B. Ellington read a paper on hydraulic power supply in towns, which brings the available published information on the subject up to date. The character of the paper forbids its publication in our columns; but it contains one passage, relating to the comparative cost of hydraulic and electrical power supplies, which deserves to be recorded, on account of its bearing upon the recently reported monopolist policy of the St. Pancras Vestry. It so happens that the materials are available for a comparison between the cost of a public supply of hydraulic power and that of electricity obtained from a central station on almost the same scale. Mr. Ellington gives particulars taken from the records of the London Hydraulic Power Company and of the Westminster Electric Supply Corporation for the year ending Dec. 31 last. In making the comparison, 1000 gallons of water, at a pressure of 750 lbs. per square inch, is taken as equivalent to 6·518 Board of Trade units of electricity. Mr. Ellington's analysis shows that the station cost of the hydraulic power is 5·172d. per 1000 gallons, pumped at the pressure of 750 lbs. per square inch; while the corresponding cost of an equivalent amount of electric energy reduced to the same hydraulic standard is 9·014d. per 1000 gallons; or on the electrical standard of Board of Trade units, 0·793d. and 1·383d. respectively. The output during the year, the capital employed, and the average rate received for both supplies, are nearly the same. The coincidence of the figures is extraordinary, Mr. Ellington remarks, except in the cost items, in which their divergence is equally remarkable. No other conclusion can be drawn than that for some reason or other, not hitherto explained, hydraulic power is much less costly to produce than electricity. The Westminster electric supply is one of the largest in the country; and its cost is one of the lowest. The London hydraulic supply is the greatest anywhere, and is produced no doubt very cheaply. In neither, however, has the minimum cost been reached. The figures of other electric supply undertakings having a better load-factor than the Westminster show a similar difference of cost as compared with the hydraulic supply. Yet Mr. Ellington does not think there is anything to be gained by employing steam-generated hydraulic power to generate electrical energy for lighting. He holds that hydraulic power is clearly much the most economical for those applications where the direct pressure can be utilized, as for lifting and pressing. Where rotary motion is needed, the special circumstances of each case will determine what power shall be used, and all are now more nearly on a par as regards cost. In London hydraulic power costs after the rate of 1s. 6d. per 1000 gallons, which is equivalent to 2·76d. per Board of Trade unit; or, say, 3d. per brake horse power per hour.

Quick Foundation Work.

According to the *Engineering Record* a novel method of sinking foundations in treacherous soil was successfully employed for the Johnston Building, New York City. Some 27 feet of mud and water charged with sand had to be passed through before the solid rock could be reached. It was therefore decided to adopt the well system of foundations. The diameters of the wells varied from 5 ft. 5 in. to 13 feet, according to the load to be carried; and in all 44 of them were sunk. They were built of ¼ inch to ⅜ inch steel plate, in 6 feet lengths. The shoe at the bottom consisted of a number of hollow cast-iron segments, having a serrated cutting edge. Each segment was connected with a supply of high-pressure water, which was allowed to issue from small perforations in the shoe. The soil around the foot of the cylinder was thus loosened; and there was no difficulty in forcing it down to a firm foundation by loading it. The maximum water pressure required was 150 lbs. per square inch. When the wells reached firm ground, the enclosed material was dug out from the top; triangular struts being used to keep their shape. It had been anticipated that quicksand would flow in under the shoe, in which case grout would have been pumped down through the water-pipes; but this precaution proved to be unnecessary. The interior of the cylinders was filled with concrete. The work was done very rapidly; some of the wells being sunk to their full depth in three hours.

Incandescent Gas v. Electric Lighting at Vancouver.—A further exemplification of the fact that incandescent gas lighting is ousting the electric light in some of the places where the latter has been much favoured, has just reached us from Vancouver (British Columbia). It seems that electric lighting was introduced there about eight or nine years ago; and both arc and incandescent systems have since been employed. Some twelve months later, gas put in an appearance—the Company starting with two consumers, and gradually increasing till they now number six hundred. Things would probably have gone steadily but for the advent of the Welsbach system. This appears to have captivated the City Council; for we learn that, at their request, the Gas Company have put up some powerful street-lamps containing clusters of incandescent gas-burners. The effect has been marvellous. There are no shadows whatever; the light is perfectly steady, and so good that a newspaper can be read 60 yards away in an open space—no other light being near, or interfering in any way. The general public freely admit that the new burners are far superior to the present system of arc lighting, which is supposed to furnish the light of 2000 candles per lamp; and the Council will, no doubt, adopt them for street-lighting purposes. We are informed that the Welsbach burners are replacing arc and incandescent electric lamps for private lighting throughout the town, notwithstanding the fact that the Incandescent Lamp Company refuse to sell, but charge a yearly rental of 12s. per lamp, 3s. for a single mantle, and 1s. for chimney-rental, paid in advance. Our correspondent states that, if these lamps could be purchased outright, electricity would be swept from the field in two years. The action of the Council looks like "good business" for the Gas Company, as they are in a fair way to get the public lighting and the lighting of the municipal buildings. Meanwhile, they are not standing idle, as they are putting in about 16 meters and stoves per month.

TECHNICAL RECORD.

THE HEATING VALUE OF COAL GAS.

By David Vass, of Portobello.

[A Paper read before the North British Association of Gas Managers, July 25, 1895.]

Coal gas is now used so extensively for other purposes than lighting, that I think I may make bold to remark that a test of the luminosity by photometry does not sufficiently deal with the product of which we are sellers, and to suggest for adoption, conjointly with, or in substitution of, the photometric standard, a standard of comparison having a more direct relation to the calorific value of the gas, instead of remaining content with the vague assumption that the heating value of a gas varies with the illuminating power. When the question of "High *versus* Low Candle Power Gas" is discussed, it is invariably suggested that we are sellers of light, and not merely sellers of gas. I prefer to support the idea that we are sellers of energy in the form of gas. We may look upon coal gas as a convenient form of heat-energy, ready to be utilized, primarily for lighting purposes, by direct combustion, or indirectly by incandescent lighting; secondly, for domestic purposes in cooking and heating stoves; and, thirdly, for commercial purposes, in reproducing energy by means of the gas-engine. Undoubtedly, our oldest friend—lighting by direct combustion—is still our best friend; but the others have assumed such importance that they demand some consideration at our hands.

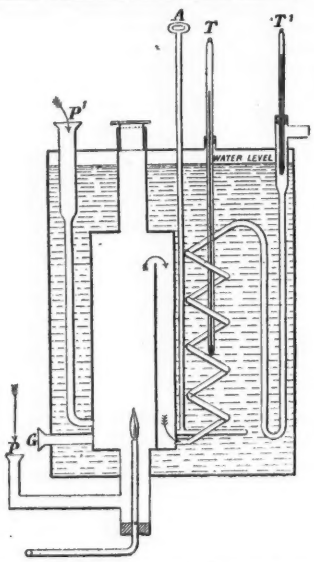


Fig. 1.—The Dulong Calorimeter.

In testing the heating value of combustible substances, the most convenient method is to transmit the heat to a measured volume of water; and I will describe some instruments specially designed for this purpose. Dulong's calorimeter (fig. 1) is an instrument designed for examining the amount of heat evolved during the combustion of solids, liquids, or gases. It is a simple apparatus, and one which only requires very slight modification to suit our purpose. It consists of a combustion chamber surrounded by water contained in a calorimeter, wherein moves an agitator, the stem of which is seen at A. The gas is conducted into the chamber through the tube, and the oxygen necessary for combustion enters by one of the tubes P or P^1. The products of combustion pass through the worm, and finally escape, but not until they have fallen to the temperature of the water in the calorimeter. Two thermometers, T T^1, are fixed—one to indicate the temperature of the water, and the other that of the products of combustion at their exit. For accurate work, these two thermometer readings should agree. The progress of combustion is observed through the opening G, which is closed by a piece of glass. The water in the calorimeter is a measured quantity; and its rise in temperature for a given volume of gas burned is taken as the datum for the results.

Taking this instrument as a basis, I designed one (fig. 2) in which the worm encircles the combustion chamber, instead of occupying one side of the cooling-vessel. This alteration was made with two ends in view—(1) to economize space, so as to have a more convenient form of instrument; and (2) to equalize the temperature of the water throughout the calorimeter, without the aid of the agitator. On the second point I have not been altogether successful. The heat of the flame striking the top of the combustion-chamber, causes more rapid heating of the overlying water at that point than at the lower depths of the calorimeter; but this I hope to overcome by introducing a bell to carry the products of combustion to the bottom of the combustion chamber before they come into direct contact with the heat-absorbing surface. The combustion chamber is made of

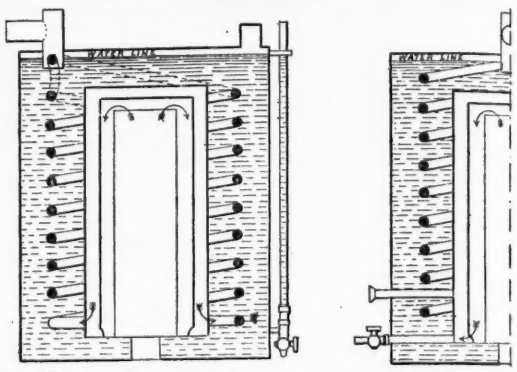


Fig. 2.—Modified Calorimeter, with Worm.

copper, and there is a partition of tin plate to cause the products of combustion to travel to the lower level of the combustion chamber, and there to enter the worms. Some difficulty was experienced in winding copper tubing sufficient in cross section to carry off the products of combustion; and for this reason two worms were used—their outlets being connected.

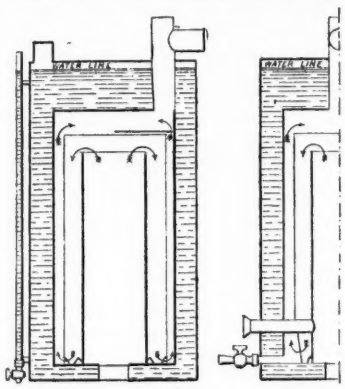


Fig. 3.—Modified Calorimeter, without Worm.

In the arrangement shown in fig. 3, no worm is used. The gases pass downwards between the tin-plate partitions, and come in contact with the cooling surface at the bottom; then, travelling upwards between the tin-plate partition and the cooling surface they pass out at the top.

I have related some of the difficulties in construction and points to be avoided for the benefit of anyone experimenting on the same lines.

An instrument known as the "Junkers Patent Calorimeter" has recently been placed on the English market,* and so far as I can ascertain, it is the only calorimeter in the market adapted for testing gases. In this instrument, the products of combustion pass downwards from the top of the combustion chamber through two rows of tubes, which are surrounded by water. A constant stream enters at the bottom of the annular water-space, and, passing upwards, is heated by the tubes already mentioned, and by contact with the sides of the combustion chamber. The rate of flow and the increase in temperature of the water are noted; and the multiple of these is the calorific value of the heat imparted to the water by the quantity of gas consumed.

There is very little difference in principle between Dulong's and Junkers' calorimeters; but one great drawback to the general adoption of the latter is the cost (£23 10s.). I am confident that an instrument as substantial and satisfactory, but less elaborate in finish, which could be put on the market at less than half the present price, would come in for more general use, instead of being kept for ornament as a highly-finished, high-priced instrument is apt to be.

The general adoption of any form of instrument would turn attention towards the perfecting of an appliance to be adopted as a standard; and such an instrument should be simple, reliable, substantial, and not too costly in finish.

Discussion.

Mr. J. M'Gilchrist (Dumbarton) said it would be most interesting to hear Mr. Vass's experience of the heating powers of different qualities of gases. He understood that the instrument Mr. Vass had designed was correct in its working.

Mr. Vass said it was with the view of ascertaining if there was a relation between the heating value and the lighting value of a gas that he began, some time ago, to make inquiries into the subject; and his first difficulty was to get an instrument suitable for the purpose. At that time, he had not seen the Junkers calorimeter. It was only advertised about November last (but at a price which, he thought, would not be acceptable to most gas managers); and he formed the idea that he would

* See Journal, Vol. LXV., pp. 71, 644.

like to make an experiment. He had found difficulties with instruments, some of which he had pointed out; and the reason he had mentioned those difficulties was that other investigators working on the same lines might know them. One difficulty was the winding of the tubes; and the other was the heating of the water at the top, owing to the flame striking at that place. Alterations on account of this had delayed the making of any experiments sufficiently satisfactory to place before the meeting; and he would prefer to have time in which to experiment with the apparatus before he could suggest anything to the members. His present communication was intended more to "draw" gas managers as to whether or not they thought it advisable that they should have a calorific test in every gas-works. He thought they should; but one drawback with him had been the expense involved.

Mr. T. D. HALL (Montrose) thought they could not but thank Mr. Vass for the paper he had just read. There was something novel in the idea of being able to tell a consumer the value of his gas for heating purposes. Most of them had consumers who did not use gas for heating or motive power; and they were occasionally asked by them the value of their gas for these purposes. Sometimes consumers would quote the illuminating power, and ask with regard to their gas which they made of higher illuminating power than their neighbours, and consequently dearer, if they would not be better with a gas of lower lighting power; and he thought that if they had an instrument like that described, they would be able to answer the question. They were assured by gas engine and stove makers that they had quite as good results from gas of low illuminating power as they did from the rich gas which they had in the North. If Mr. Vass could perfect his calorimeter, he would put an instrument into their hands which, as gas managers, they would find extremely useful.

Mr. A. MACPHERSON (Kirkcaldy) said it should not go forth to the world that they could get the same results from a low-quality as from a high-quality gas. He thought Mr. Young had made it very plain that morning that, if they had a high-quality gas, they would get an equally high value, however they used it, whether for heating or for motive power purposes. There was no doubt that in the illuminating power the carbon was what controlled the light; and it was the same with the heat and motive power.

Mr. A. YUILL (Alloa) also considered that the remarks of Mr. Hall should not go forth. He held in his hand a report from one of the largest gas-engine makers of the day. He put to him the question as to what was the difference between 16 and 30 candle gas; and the reply was that the percentage of 16-candle gas was 11, and the air volume 89. If they were dealing with 20-candle gas, the percentage of gas was 9·5, and the air volume 90·5. If they were dealing with 30-candle gas, the gas fell to 7 per cent., and the air volume was 93 per cent. This clearly showed that, the richer the gas, the less they required for motive power. When they came to Dowson gas, they required 44 per cent. of gas and 56 per cent. of air. This was going the other way; and it very clearly demonstrated, he thought, that the richer the gas the less they required of it.

Mr. D. M. NELSON (Glasgow) said the question before them was one which had been often raised—whether the blue or the white flame (meaning low or high quality gas) did the most cooking. He was in a position to state, with reference to two stoves, identical in all respects, except that to the one 20, and to the other 26 candle gas was supplied, that a joint was cooked by the 26-candle gas in a third of the time in which one was cooked by the 20-candle gas. He was satisfied of this, that the calorific power of rich gas was greater than that of low-quality gas, notwithstanding the authorities to the contrary. With a high-quality gas, they did cooking in less time than with low-quality gas, and with a corresponding saving of gas.

Mr. J. HEPWORTH (Edinburgh) remarked that, though these observations were taking them rather off the line, they were perhaps useful. He did not think anyone would dispute that high-quality gas had a high calorific power; but in the southern part of the kingdom they had gone farther, and said: "Yes; but which is the cheaper to use?" This brought them back again to the paper. He thought if they had an instrument like the one described, and observations could be made regularly with it, it would be useful to the manager of a gas-works, in enabling him to know what was the calorific value of the article he was selling, as well as he knew the illuminating power. He wished Mr. Vass had been able to give them some illustrations as to what he had found, in ascertaining the thermal value of gas. This would follow afterwards, of course; but as a matter of fact, if they had the power to make the tests alluded to, it would be of great advantage to them, by enabling them to see what was the value of their gas, now that it was so largely used for heating purposes.

Mr. HALL said he would just like to mention that, while admitting that from a rich gas they would get possibly better results than from a poor one, they at the same time all knew that the richer the gas the more difficult it was to develop heat; and the question of price had also to be looked at. Where gas was only employed for heating and motive power, he still said it was a question whether it was not very much cheaper to use gas of low illuminating value for this purpose than a rich kind which was difficult to develop, not only in stoves but also in gas-engines.

Mr. MACPHERSON said he must entirely differ from Mr. Hall in this matter. There was not the slightest doubt that this was the old bogle raised. They were told they could not burn 28-candle gas. But they all knew this to be downright "bunkum," for they could burn any quality of gas. It was said that they could not reduce the carbon—that there was a greater difficulty in getting the full value from the carbon in a high-quality than in a low-quality gas. Well, there was as much difficulty, and more, in admitting too much air to the low-quality gas, and thereby cooling the flame. If they had a little too much air, in the case of the rich gas, they did not suffer so much as they did in the case of the poor gas, because they reduced to a greater extent the heating power of the low-quality gas by the admixture of too much air.

Mr. HALL thought everybody who had had any experience of using the two qualities of gas would admit that they had less trouble with the low quality, both in lighting and heating. As gas managers, they knew very well how to burn any gas; but the difficulty was to educate their consumers.

Mr. MACPHERSON said the apparatus could be made suitable. They knew that a gas-fire made for English gas would not burn Scotch gas; but they had makers who could produce stoves to suit each. It was the same with gas-engines. The matter was regulated for them; and the consumer was only called upon to turn the tap.

The PRESIDENT said the discussion had wandered into a sort of side issue; but he thought this only showed the necessity for having an instrument such as the one described, by which to measure the heat. He could only say he hoped Mr. Vass would be encouraged to go on with his inquiries.

Mr. VASS said it was a complaint from a consumer who used a cooking-stove, that there was not sufficient pressure to do the cooking, which put him upon his inquiry. He had been using an inferior coal; and he set himself to ascertain whether there was really so much difference in the heating power of a low-quality gas as to cause such inconvenience. It was not with the view of putting forward any special system that he took up the subject; but rather with the idea that gas managers might be induced to turn their attention to experiments in that direction. One man could not arrive, in the little time he had at his disposal, at what would be the best and cheapest thing for the trade. He wished to get others to look at the question; and perhaps something more might be arrived at.

GAS MAKING FROM SPLINT AND SHALE, AND FROM SPLINT AND OIL.

By A. WADDELL, of Broughty Ferry.

[A Paper read before the North British Association of Gas Managers, July 23, 1895.]

For the past year or two, the subject of the enrichment of coal gas by means of oil has been receiving a considerable amount of attention. At our two previous meetings, the application of the Peebles process to that purpose was prominently brought under our notice; and at the "Informal Meeting of Gas Managers," held in Glasgow during the spring of the present year, the subject received a good deal of attention. Having had some little experience in the use of oil as an enriching agent, it occurred to me that I might contribute a paper giving the plain and unvarnished practical results we have obtained at Broughty Ferry during the year ended May 31, 1895, stating under what circumstances and conditions they were realized, with deductions therefrom; and I hope they may be useful to anyone who may wish to consider the advantages and disadvantages of the several systems of working, viz.:—

(1) The carbonizing of shale and splint coal, in settings of four retorts by direct fires;

(2) In settings of six retorts on the regenerative principle; and

(3) Carbonizing splint coal in the latter settings, and oil by the Peebles process.

Prior to the introduction of this oil process, we used splint coal and shale, because we had best value offered to us in these materials, owing to local circumstances.

I have given the cost of gas-making materials stored in our works, only adding the extra outlay for purification and cartage of refuse due to the use of shale. But as the price varied largely throughout the year, owing to the late coal strike, and as most of the dear coal was used during one section of the year's working, it would be unfair to that section to charge all the increased price of coal against it. Therefore, in order to make a fair comparison of the different ways of working, it is necessary to estimate what the results would have been with coal at uniform cost; and I prefer to take our contract price for this purpose.

To enable those who may desire to do so to verify the year's results, I have here our balance-sheet, from which it can be seen that the total cost for materials was as under—

Gas coal	£1774	4	6
Gas oil, *plus* royalty, at £2 15s. per ton	442	7	2
	£2216	11	8
Less residuals . . .	1075	3	11
	£1141	7	9

To this £1141 7s. 9d. there falls to be added—

Extra cost of purifying	£53 7 9	
Trimming of coals	34 3 9	
Cartage of odd quantities of coal	24 13 3	
Cartage of shale refuse	11 3 6	
Excess of coals over invoice weight	10 2 0	
	£133 10 3	
Making with the	1141 7 9	
A total of	£1274 18 0	

Gas made during the year 1894-5, 33,692,000 cubic feet.
Average illuminating power for the year, 26·02 candles.

These figures, so far as this paper is concerned, are all important. They are the sum of the three tables "A," "B," and "C" which follow, are half the subject matter, and must form the basis of most particulars hereafter given. According to them, the cost of gas for the year was—

Per 1000 candles	1·71d.
Per 1000 cubic feet of 25-candle gas	8·56

With coal at our contract price, the cost would have been—

Per 1000 candles	1·47d.
Per 1000 cubic feet of 25-candle gas	7·36

The materials given in Table A were carbonized from June 1 to Aug. 9 last year in settings of four retorts by direct firing; and the bench was in good order. The retorts and settings being renewed annually, is evidence that nothing was spared to keep this plant in good condition.

TABLE A.

	Tons.	Cwt.	Rate per Ton.		
Splint coal	153	14	9s. 11½d. =	£76 8 8	£166 6 6
Shale	117	5	15 4 =	89 17 10	
Cartage of shale refuse, 70½ tons at 8d.					2 6 10
Extra cost of purification incurred on account of excess of impurities in shale = 1·33d. per 1000 cubic feet					12 8 9
					£181 2 1
Less residual products, coke *nil*, tar, and ammoniacal liquor, at 3s. 2d. per ton of coal carbonized					38 10 11
					£142 11 2
Less, calculating splint coal at 9s. 2d. per ton (the contract price), a difference of					7 12 4
					£134 18 10

Gas made from above material . . . 2,269,500 cubic feet
Average illuminating power . . . 25·81 candles
Cost per 1000 cubic feet . . . 15·07d.
Cost per 1000 candles . . . 2·92d.

Taking the above splints at 9s. 2d. per ton (the contract price), the cost would be—

Per 1000 cubic feet of 25-candle gas	13·8d.
Per 1000 candles	2·76

It will be noticed no coke was sold while using this setting; and considering the proportion of shale carbonized, &c., the result is not unusual.

The materials given in Table B were carbonized in a good regenerative setting from Aug. 9 to Nov. 5.

TABLE B.

	Tons.	Cwt.	Rate per Ton.		
Splint coal	411	13	13s. 10½d. =	£285 11 4	£531 0 0
Shale	320	0	15 4 =	245 8 8	
Cartage of shale refuse					6 8 0
Extra cost of purifying incurred on account of excessive impurities in shale					40 19 0
					£578 7 0
Less residuals—					
Coke				£54 18 8	
Tar and liquor, at 3s. 2d. per ton of coal carbonized				115 12 9	170 11 5
					£407 15 7
Less, calculating splint coal at 9s. 2d. per ton (the contract price), a difference of					96 17 10
					£310 17 9

Gas made from above materials . . . 7,303,500 cubic feet
Average illuminating power . . . 25 candles
Cost per 1000 cubic feet . . . 13·4d.
Cost per 1000 candles . . . 2·69d.

Taking the above splint coal at 9s. 2d. per ton (the contract price), the cost would be—

Per 1000 cubic feet of 25-candle gas	10·25d.
Per 1000 candles	2·05d.

It will be noticed that in Table B, we had a saving of £54 18s. 8d. in coke sold, though the proportions of splint and shale were similar to those used in the direct-heated retorts.

The materials given in Table C were carbonized in oil-gas retorts from Nov. 5, 1894, to May 31, 1895.

TABLE C.

	Tons.	Cwt.	Rate per Ton.		
Splint coal	2267	13	9s. 10d. =	£1116 0 4	
Shale	40	13	15 3¾ =	31 3 0	
Oil, *plus* royalty, at £2 15s. per ton				442 7 2	£1589 10 6
Cartage of shale refuse					1 0 4
Carried forward					£1590 10 10

Brought forward		£1590 10 10
Less residuals—		
Coke	£468 10 0	
Tar and liquor, at 3s. 2d. per ton of coal carbonized	365 9 7	
Oil coke	32 0 0	
	865 19 7	
	£724 11 3	
Less, calculating splint coal at 9s. 2d. per ton (the contract price), a difference of	75 11 10	
	£648 19 5	

Gas made from above material . . . 24,119,000 cubic feet
Average illuminating power . . . 26·79 candles
Cost per 1000 cubic feet . . . 7·1d.
Cost per 1000 candles . . . 1·33d.

Taking the above splint at 9s. 2d. per ton (the contract price), the cost would be—

Per 1000 cubic feet of 25-candle gas	5·95d.
Per 1000 candles	1·19d.

It is interesting to notice the gross and net cost of materials with the residuals sold by the various ways of working, as under:—

—	Splint and Shale in Old Settings. A.		Splint and Shale in Regenerative Settings. B.		Splint and Oil by the Peebles Process. C.	
Materials.	Actual.	Allowing Contract Price for Coal, at 9s. 2d. per Ton.	Actual.	Allowing Contract Price for Coal, at 9s. 2d. per Ton.	Actual.	Allowing Contract Price for Coal, at 9s. 2d. per Ton.
	Pence.	Pence.	Pence.	Pence.	Pence.	Pence.
Gross cost per 1000 candles	3·70	—	3·82	—	2·92	—
Residuals sold do.	0·78	—	1·12	—	1·59	—
Net cost do.	2·92	2·76	2·69	2·05	1·33	1·19
Cost per 1000 cub. ft. of 25-candle gas	14·50	13·80	13·40	10·25	6·60	5·95

At the last informal meeting of Scottish Gas Managers, when we had been working with the Peebles process for a very short period, and having (as time has now proved) just passed our initial difficulties, caused by starting the plant before it was quite complete, I then believed, and stated, that we expected to save about 1d. per 1000 cubic feet. I am pleased to-day to admit that I was then wrong. Comparing it with the results of the regenerative working, we save 4·30d. per 1000 cubic feet of 25-candle gas; and with the direct-heated retorts, 7·85d. This, with other improvements, has enabled us to reduce the price of gas 10d. per 1000 cubic feet.

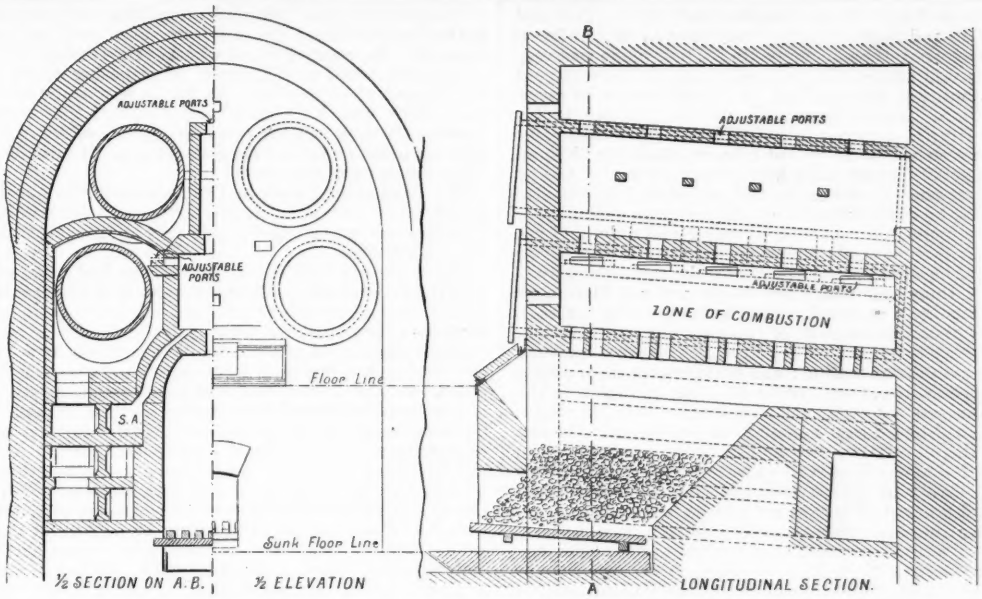
Since the introduction of the process, its simplicity has been recognized by all. We can fully confirm this. When working with two men on each shift, one man had charge of the oil, and the other the coal retorts; and when the second man went off, the coal-retort man had no difficulty in working both coal and oil retorts. At first, the men were rather averse to working the oil-gas retorts; but now they are all anxious to have that work.

When the stock of gas falls low, we find it a great advantage (by simply running more oil into the retorts) to get the lighting power largely increased; thereby giving our consumers sufficient light, if not volume, until we have gained our normal position.

It has been pointed out by others that it depends largely on circumstances what advantages will follow the adoption of this process. In our case, we can secure at a fair cost splint or coking coal, which gives us an excellent coke, for which we have a good market. We receive the same for the tar and liquor from this coal as we did from expensive coals; leaving us a low net cost for material. The Peebles process enables us to use a large quantity of this cheap coal; and the oil is at the same time by far the cheapest enriching system we can secure.

The plant is now well known to you all. It is simple and easily worked, save for one thing—viz., the tendency of the retorts to crack; and this, I understand, is being gradually overcome. We must all agree that, to keep a cast-iron cylinder red hot from without, thereby expanding it, and then to keep flowing along a line of its inner surface, in direct contact with it, a continually cold stream of oil, thereby contracting only that particular part, is surely a severe strain on the iron, and must tend to crack it. To save it from cracking, you must keep the retort, particularly along this line, as near the temperature of the body of the retort as possible, by removing all obstructions in the form of thick brick walls, or any wall at that part. I understand that, instead of a loose steel plate, there has been substituted at some gas-works a steel plate or false bottom to the retorts, held in position by fillets cast on the sides of the retorts. This has given very satisfactory results.

As uniform heating is necessary in coal-gas retort-settings, there has been special reason for saying this in connection with oil-gas retort-settings. We have worked our retorts at Broughty Ferry for more than seven months without the least sign of cracking or unevenness of any kind; the retorts looking as if they would last for four or five years. This means a very great saving in money and anxiety on the part of the manager fearing that the retorts may give way just when they are most needed without others to fall back on.



OIL SETTING (PEEBLES PROCESS) AT THE BROUGHTY FERRY GAS-WORKS.

I have here diagrams of our regenerative oil-gas retort-setting designed and worked by me continuously for the past seven years, constructed on the following lines: (1) Large furnace bar area, large producer, combustion chamber, and flue capacity; hence slow travel of gases. (2) The least possible amount of brickwork about the retorts consistent with efficiency, and placed to give uniformity of support—all as thin walls not exceeding 4½ inches thick, with frequent openings immediately around the retorts. (3) Simplicity of construction; and hence economy, with greatest facility to see the interior. (4) The zone of combustion of gases parallel to the retorts, and extending from front to back of the oven; the resultant gases afterwards travelling at right angles to the zone without a turn, save as the arch and wall of the oven direct, until underneath the bottom retorts.

Discussion.

Mr. J. M'GILCHRIST (Dumbarton) asked Mr. Waddell if he had saved 7d. per 1000 cubic feet by the introduction of oil—that was, comparing the charges with those of the previous year, when he was working with shale.

Mr. WADDELL said the way he had given the facts was this: In the previous year, he was working with shale and splint coal; and he put the cost of the materials used in the previous year against the cost of those used in the year just closed. It might be said that, to some extent, it was in the buying of the coal, or that it was in better working; but he could admit that they had their material for gas making for 7·85d. less than in the previous year.

Mr. A. MACPHERSON (Kirkcaldy) asked if they paid the same price for splint coal, or if there had been any fall in the value of the coal used.

Mr. WADDELL said it was pretty much the same.

Mr. MACPHERSON asked if Mr. Waddell obtained the same for residuals in the two years. He would possibly get about double for tar and liquor in one year that he did in the other.

Mr. WADDELL said that was quite true; the figures were 1s. 10½d., as against 3s. 2d.

Mr. A. YUILL (Alloa) felt it very refreshing to get one standing up and advocating the process which he himself had been advocating all along. At the spring meeting of gas managers in Glasgow, he had to bear a severe castigation; but Mr. Waddell was, perhaps, better able to meet them. The position, so far as he understood Mr. Waddell, was this: He gave his working before the introduction of the oil process, and at the price of coal before the miners' strike. The cost of this appeared to be 15·07d. per 1000 cubic feet. In Table B, giving the contract prices of coal, the cost was 13·04d. per 1000 cubic feet; and the net cost for splint coal, shale, and oil was 7·01d. Then they found, compared with the results of regenerative working, a saving of 4·03d. per 1000 cubic feet. He understood Mr. Waddell to say that there was a saving of about 4d. per 1000 cubic feet by the introduction of the oil process; the difference between that cost and the full saving being attributable to the full saving effected by the regenerative system of heating the retorts.

Mr. MACPHERSON: And the increased price of tar and liquor.

Mr. YUILL said, naturally, they all had the benefit of that. There was another fact which might, perhaps, bear with Mr. Waddell, which was the large proportion of coke he had to dispose of. He understood that the price Mr. Waddell received for coke was very much in excess of what they generally obtained. He was glad to find that the costs given were very much the same as his own costs. In taking the coal, oil, and royalty, less residuals, for the full year's working, the cost equalled 7·48d. per 1000 cubic feet; but deducting the sum paid owing to the miners' strike—which came to, on the average of the whole year's working, 0·43d.—there would be left a net cost, on the contract prices, of 7·05d. per 1000 cubic feet. It was no use his going into the estimates for this year. He might, however, say that they were considerably less than what their past year's working had been. But there was one thing he might mention. In these figures, they had had presented to them as an Association the actual cost of the oil process for the past year or two; and it might assist in the discussion of questions like this if they had the actual costs to produce the same illuminating power of gas, or near it, placed alongside, so that they might see how they stood in the meantime. They sometimes imagined that they were doing better than other people; but if they kept their eyes open, they might see differently. It might be better if someone had the courage to give them the figures he obtained in the working of coal and shale.

Mr. MACPHERSON said that, without deducting residuals, he thought it did not cost him so much. He supposed he did not get as good a return for residuals; but, on the whole, he believed he was making coal gas of equal quality as cheap as Mr. Yuill. While he admired the Peebles system, and must allow that it was a most unique process, and one which he believed was bound to make way, there were a great number of things to be considered. For instance, Mr. Yuill said that Mr. Waddell obtained a very fine price for coke. He did not know what the price was per ton.

Mr. WADDELL: I get 11s. per ton.

Mr. MACPHERSON said most of them would consider themselves very happy with something like half of that figure. For his own part, if he had the same amount of coke thrown upon his hands as he would have if he were to go in for carbonizing only splint coal and using oil for enriching, he supposed he would not get more than 2s. 6d. for it. There was no demand for coke; and therefore, as he had said, the benefit of the process was all according to the circumstances of the district. Everyone must consider the subject according to the circumstances in which he was placed; and in his own case he considered that, if he were to adopt oil enrichment, it would entail upon him a very serious loss. He did not say but that, in some places, it might be a very considerable gain.

Mr. YUILL said he had put the question to Mr. MacPherson if they could get the figures which his gas cost; but all his answer was: "I am doing better than you."

Mr. MACPHERSON said that if Mr. Waddell obtained 11s. per ton for coke, and he could only get half of that, how could he give figures? He could only say he was doing well.

Mr. YUILL said that what he asked for was the net cost of the gas—the plain facts; and they would be able to judge for themselves.

Mr. MACPHERSON said it simply resolved itself into the old position, that it was a question of circumstances. It was impossible for him to compare what he would do with oil, as against what Mr. Yuill or Mr. Waddell would do, when he told them honestly that he could not get 2s. 6d. per ton for the coke which would be thrown on his hands. He had to use a non-coking coal largely, so as to get it disposed of.

Mr. J. HALL (St. Andrews) said he had not intended to have said anything in the discussion; but he must own that he was very much taken with what Mr. MacPherson had said—that the circumstances of each gas undertaking must rule their preference for splint or oil enrichment. At least to him it was very strongly put. His Directors were most anxious that he should follow suit with those who had adopted the oil process. They had

heard about it, and read the statements made by Mr. Yuill and others about it, and were thinking that they in St. Andrews were not doing what they ought to do. Their place was very small; and it was surrounded on every side by Government property, so that they were obliged to make the most of every corner they had. However, he did contrive to say to his Directors: "Here is a corner in which I can erect apparatus for oil, if you wish me to do it; but I do not think it will be an advantage to you." Their retort-house was very small; and he was obliged just now to work shale, and cannel, and splint. He did not see how he could extend the retort-house—at least very much; and he found, were he to work splint coal only, and use the oil process, that he would have as many retorts working as at present, and he would not make nearly the same quantity of gas. Another thing was that they would not get their coke sold. Their locality was small. They had a demand for coke just now; but at certain seasons of the year they were obliged to sell it at a very low price. They were nearly three-quarters of a mile from a railway station; and cartage cost them nearly 1s. per ton. Then, also, they had to add the reduction in the price they obtained for their tar. Upon the whole, therefore, from what he had heard from some of his younger friends who had adopted the oil process, they had had considerable trouble, and had great doubts whether they were better off than they were before. He had had a talk with one who had been working the oil process all last year; and he had had considerable complaint from his consumers. Of course, that was owing to the burners; but he was no better than he was in the year previous. He thought that, in a locality where they were at a considerable distance from a railway, if they could sell gas of from 25 to 26 candle power at 3s. 6d. per 1000 cubic feet, they were not doing very badly. Broughty Ferry was a near neighbour; and he was naturally a little anxious at living near a gas manager who was doing so well. He thought the paper, in some respects, was not just a fair contrast between the two years—working with a change of retorts. Mr. Waddell entered lately into these works, and had made changes upon them; and the comparison did not seem, to his mind, just so fair as he considered it might be. However, he thought they might give Mr. Waddell credit for what he had done. But his main object in speaking was to confirm what Mr. MacPherson had said—that the circumstances of each case must rule their action. He could not see it otherwise.

Mr. A. Bell (Dalkeith) said that Mr. Waddell's paper was full of figures, and would require some time to look over. He himself had had no difficulty with the oil process; and they had been working it for two years. Some people, apparently, said they had had difficulty; but he had had none—not even a burnt hand in the works. It had been nothing but plain sailing all along. With regard to cracked retorts, he had them badly cracked last year, by careless working. This year he had rolled them round; and they would now serve him another season. Mr. Waddell said he believed that the steel plates would be a very great saving. They had been using a steel plate in Peebles, and probably they would get a report regarding what had been done there. His retorts, unfortunately, had deep mouthpieces; and he could not use a fixed sole plate. But he used plates which were lifted out and in at each charge. As regarded coke, in this matter they could force a sale. When he went to Dalkeith, he could scarcely get into the yard for coke; but he set himself to sell it. He showed the advantage, to bakers and others, of changing their fires from coal to coke; and he had now no difficulty in selling his coke. In fact, last year he had to send to Edinburgh for coke to supply the local people. Of course, everyone must speak for his own circumstances; but he thought if Mr. MacPherson would consent to enlighten them as to his figures, they would be able to make a better comparison.

Mr. T. Douglas Hall (Montrose) said he could not go into the figures, but he would like to go outside the works, and ask Mr. Waddell if he had found it necessary to take charge of the oil gas up to the point of combustion, or if they ever had any difficulty in burning the gas, or in dealing with the consumers.

Mr. Waddell said they would notice that their gas had never been very high, and he had never had any difficulty to speak of. For about two months in the winter time they made gas of about 28 candles. That was too high; and there was a little trouble at that time, but never since. If Mr. Hall was thinking of condensation, he might say—and he thought there were some there who could confirm him in that (at least he could speak for his own town)—that the traps had never been pumped since he went to Broughty Ferry. There was nothing in them; and he understood that they had not been pumped for the last eight years. It was rather a peculiar circumstance, but it was so.

Mr. Hall said it was the burners he referred to—the consuming of the gas.

Mr. Waddell said he had had no difficulty excepting during the two months in which he was making gas of a quality up to 28 or 29 candles.

Mr. J. Ballantyne (Rothesay) said he had not intended to take part in the discussion, for the simple reason that he had had no opportunity of doing anything with the oil process, as they had not even a corner in their works to place it in. They were soon going to have new works; and he did not know what they might then do. A great deal had been said with regard to the price of coke. He understood that the prices mentioned in the paper referred to coke from splint coal, and not to coke from oil. He wanted to ask whether those who were using the oil process found any difficulty in disposing of the coke from the oil, and at what price. He had a hint some little time ago that there was a difficulty about it, and that there was not much more than half the price being realized for this coke that they were led to expect they would get. He would like to get information upon this point.

Mr. Bell said he would like to answer the question, so far as he was concerned. Last year he sold the whole of his oil coke (he sent it to Armstrong's works at Elswick) at the price of 19s. 6d. per ton.

Mr. Waddell said it was only in the first part of the year that they had coke to sell, and they wished to sell it in the place if possible. Some of their buyers were not quite prepared to start with the oil coke at first; but they had now made a contract for the year at 16s. per ton. Since the contract was made, they had had complaints from more than one consumer in the place, that they had sold all the coke to one party.

The President said the question of coke seemed to be bulking very largely in the discussion. He did not see why the oil coke could not be got rid of. The coke from his station alone, in Glasgow, was at least 80,000 tons a year; and they got rid of it at 6s. per ton. They sent it a long way past Fife. Perhaps one of the reasons why they obtained a better price for coke was that it was of better quality, by reason of their using a better coking coal. He did not think there should be any difficulty in getting a market for coke, if it was of exceptionally good quality, when they in Glasgow got rid of what he might call their poor coke. He thought they were all indebted to Mr. Waddell for having had the courage to bring forward his figures. It was the pounds, shillings, and pence that were the root of the matter in the end. Each man had to take his own surroundings, and the circumstances connected therewith, into consideration; but there should not be such a great deal of difference due to locality, but what could be given in figures. If the figures were given as fair as possible, it would be easy to judge of the benefit to be realized from any innovation. He thought they were certainly very much indebted to Mr. Waddell for giving them the figures he had. The only mistake, he thought, was that the figures were too small; if they had been larger, there might have been a better discussion.

Mr. D. M. Nelson (Glasgow) said that no reference had been made to Mr. Waddell's setting of retorts. One of the crucial defects of iron retorts was the want of a proper setting. Now, having taken some interest in the longevity of iron retorts, he (Mr. Nelson) would say that Mr. Waddell had fallen upon a condition of matters in which the life of the retorts would be preserved. He had seen, during the last eight or ten weeks, a setting of retorts discarded because of their being burned out. Now, he thought this would not happen in the case of Mr. Waddell, because he had allowed a certain space for the flame to pass through, so as to heat the retort pretty regularly all over, which would thereby maintain its life.

Mr. Waddell said his paper was nearly altogether a matter of figures; and his desire was that the figures should have appeared more clearly. He said, in his paper, that circumstances had had a great deal to do with the matter; but it was also true that, so far as the coke market was concerned, they were largely assisted by the Peebles process in this way, that it enabled them to use a quality of coal that made a good coke. This was due, to some extent, to the Peebles process. With regard to the comparing of the past with this year's working, Table A gave a fair comparison with last year, with the same price of coal, of shale, and of splint. The circumstances were all the same in this particular case. Table B had the same price of coal again, but with regenerative settings. In Table C they had regenerative settings and the Peebles process. He thought it might be a little interesting to call the attention of the members to the changes from the one to the other. He thanked the meeting very much for the generous way in which they had treated his paper. He had been very anxious to place the matter as plainly and as clearly as he could before them; and if they thought there was anything wrong with the figures he had given, they might just turn back to the reports by others.

Mr. Waddell writes to say, with reference to his answer to Mr. MacPherson's question in regard to the price he obtained for residuals, that he believes it was misunderstood by some in the meeting. The prices he gave were a comparison between what they received at one period of the past year with what they obtained at another period; and were not a comparison between the prices in the past year and those in the preceding year.

The Incandescent Gas-Light Company and the De Mare System.—A short time ago, the Incandescent Gas-Light Company, Limited, applied for an interim injunction against the De Mare Incandescent Gas-Light System, Limited, to restrain them from manufacturing or selling. An order was made for the cross-examination of witnesses for the defendants; but Justice Day, sitting in Chambers, has ordered the proceedings to be stayed, and the application for the injunction to stand over until the trial of the action, without any undertaking on either side.

BAVARIAN ASSOCIATION OF GAS AND WATER ENGINEERS.

The proceedings at the Tenth General Meeting of this Association, which was held at Hof on the 28th of April, have recently been published in the *Journal für Gasbeleuchtung*. From that report the following short abstract is made :—

The President, Herr Horn, of Augsburg, opened the meeting. After accepting the officially tendered welcome to the town of Hof, he called for the Treasurer's report, which proved very satisfactory. At the close of its year, the Association had 95 members. The President was re-appointed for the ensuing year; Dr. Schilling was elected Vice-President; and Würzburg was chosen for the next general meeting. Herr Kullmann read a paper, in continuation of one on the same subject given by him last year, on "The Testing of Water-Mains for Impermeability;" and later on he gave descriptions of the water supplies of the towns of Biebrich and Hof. Dr. E. Schilling then related his "Experiences on the Practical Carburetting of Gas with Benzol" which were gained at the Munich Gas-Works. He considered the price of benzol the most important factor in determining its use for the purpose; and he announced that South German works would be able to obtain it during the year 1895-6 at a price of about 1s. 2d. per gallon, while in future no great rise need be anticipated, since the competition of cannel and of benzol from the English market would be felt. Though cannel was comparatively cheap in Munich, carburetting had, he said, been adopted with favourable results; and the heats of the furnaces had been raised until a gas production of 11,500 cubic feet per ton of coal was obtained—the illuminating power of the gas being subsequently brought up by means of benzol. Revivification of oxide in the vessels, by the addition of 1 per cent. of air to the gas, had been introduced, and the labour of changing vessels thereby reduced to one-third its former amount. The depreciation of illuminating power by the air was counteracted by the addition of benzol to the gas. It was found that about 7 gallons of benzol sufficed, on an average, to raise 100,000 cubic feet of gas to the statutory illuminating power. The carburetting apparatus* is in use in other towns. It is designed to produce an intimate mixture of the benzol vapour with the gas, without exposing the benzol to the atmosphere; and thus risk of fire is diminished. In the summer, it is used cold; in the winter, it is warmed by steam. In Munich, deposits in mains and destruction of flexible joints had not followed the employment of benzol. Herr Haymann, of Nuremberg, then related his experiences with syphons on mains, and recommended boxes of rectangular section for them, as more readily accommodating themselves to the paving of the streets. He said he had found enamelled metal plates better for the tops of street-lamps than the milk-white glass often used. He also spoke of furnaces for burning coke refuse, and of gas-cookers. Herr Horn, of Augsburg, next described his burner for cooking purposes, which has been extensively used in Regensburg and neighbouring towns; and he then proceeded to describe a series of experiments on the heating of the school-rooms at the latter town with gas, wood, coal, and anthracite in turn. With careful manipulation, gas was, he said, found to be as economical as other fuels for the heating of schoolrooms, owing to the frequent periods of disuse; while the temperature could be more conveniently regulated. Herr L. Haas, of Mayence, described a new automatic prepayment gas-meter; and Herr Trostorff, of Nuremberg, read a paper on the Junkers calorimeter.† Herren Teller, of Munich, and Treudel, of Berlin, referred to incandescent lighting; and the meeting was then formally brought to a close. On the following day, a number of members of the Association made an excursion to Dessau to inspect the gas tramway in that town.

Institution of Junior Engineers.—The annual summer meeting of this Institution, whose head-quarters are in London, takes place from the 17th to the 24th inst.; the *rendezvous* being Belgium. The towns to be visited include Antwerp, Brussels, Ghent, and Liége. An excursion to Verviers (where is situated the celebrated Gileppe reservoir, from which the town receives its domestic and manufacturing supply) is also included in the programme.

Mr. Allan Gillespie, who was well known to gas managers, not only in this country but abroad, as foreman in the meter-works of Messrs. W. & B. Cowan, Limited, in whose service he had been for the long period of 29 years, died at Peebles last Friday. Mr. Gillespie was born in Glasgow, at the time when his father was works foreman to Messrs. Cowan; and he went to Edinburgh with the firm when they transferred their business to that city. He succeeded his father as foreman; and in that capacity he had charge of the fitting up of many important meter appliances. He was a most intelligent and faithful employee. Mr. Gillespie's last illness is said to have been hastened by worry experienced in connection with an action he was obliged to defend in the Sheriff Court of Edinburgh, in which a workman sued him for damages for slander. Mr. Gillespie was successful in the litigation; but, of course, he was unable to recover his expenses from the workman. It is satisfactory to know that they were paid for him; but the circumstance preyed upon his mind as much as if he had borne the charge himself.

* See JOURNAL, Vol. LXV., p. 536. † *Ibid.*, pp. 71, 644.

DR. LOVE ON ACETYLENE AS AN ENRICHER.

A short time ago, Dr. E. G. Love, the Gas Examiner for New York, gave a lecture before the Society of Gas Lighting on the subject of "Acetylene as an Enricher." The substance of it was given in a recent number of the *American Gaslight Journal*, from which we have reproduced it.

The future of carbide of calcium, so far as the gas industry is concerned, will depend primarily upon its cost, the quantity of acetylene obtainable per ton of the carbide, and the value of the acetylene as an enriching agent. As to the cost of the carbide, there does not seem to be any probability that it can be produced at a price which will make it available to any considerable extent as an enricher in the manufacture of illuminating gas. There are special cases in which it will doubtless be of great value, even though its market price is altogether too high for ordinary use. Regarding the yield of acetylene and its enriching value, considerable work has already been done experimentally to determine these points; and in what follows, I give some results which I have obtained in these directions.

Theoretically, 1 lb. of pure carbide will give 5·91 cubic feet of acetylene, at 60° Fahr. and 30 inches pressure. This yield cannot be obtained in practice, however, owing to the various impurities which the carbide contains. The highest result I have obtained was 5·34 cubic feet, and the lowest 4·38 cubic feet per pound; the average being a little over 5 cubic feet per pound at 60° Fahr. and 30 inches pressure. The tests were made upon different samples; and the quantity of carbide used ranged from 2·28 oz. to 11 oz.. I see no reason why the carbide, when furnished in large quantities, cannot be expected to yield 5 cubic feet per pound, or 10,000 cubic feet per ton.

In some cases, the resulting acetylene was strongly contaminated with sulphuretted hydrogen; while in others, it was entirely free from this impurity. Its illuminating power is remarkably high—greatly exceeding that of any other gas; and in order to avoid smoking, it is necessary to burn it in small quantities. I have obtained, as the average of a large number of tests with different samples of gas, 56·22 candles for a consumption of 1·224 cubic feet, or 229·65 candles for 5 feet. The quantity of foreign gases in the samples tested in no case exceeded 1 per cent. The burner used was Bray's 0000 flat-flame, which developed a flame without smoke.

In these tests, I aimed to determine the quantity of light which would be obtained in ordinary practice. The somewhat higher result of 240 candles, which has been reported, was obtained by burning the gas in larger quantities and under especially heavy pressures.

Experiments to determine the enriching value of acetylene were made with uncarburetted water gas, carburetted water gas of low illuminating power, and poor coal gas. These were compressed in steel cylinders for transportation to the laboratory. The acetylene for these experiments was prepared with special care. After collecting in a holder, it was submitted to analysis, and none was used which contained more than 1 per cent. of gases not absorbed by bromine and caustic potash. In most cases, the gases other than acetylene amounted to from 0·4 per cent. to 0·7 per cent. No attempt was made to make any one series of tests with a single lot of acetylene.

Tests with Uncarburetted Water Gas.—This gas, which had been subjected to lime purification, had the following composition :—

Hydrogen	49·92 per cent.
Carbonic oxide	38·12 ,,
Marsh gas	3·17 ,,
Nitrogen	8·79 ,,
	100·00

The solubility of acetylene in water, and its high illuminating power, rendered it very doubtful whether accurate results could be obtained by the simple measurement of the gases and their mixture in a holder. But, in order to determine the extent of this probable source of error, some experiments were first made with mixtures in which the quantities of the two gases were determined by means of accurate meters, but of which no analyses were made. These results are given in the following table :—

TABLE I.—*Mixtures of Acetylene and Uncarburetted Water Gas.* (*Mixtures not Analyzed.*)

Acetylene. Per Cent.	Water Gas. Per Cent.	Candle Power for 5 Cubic Feet of the Mixture.	Illuminating Value of Acetylene.
19·02	80·98	12·44	65·40
20·30	79·70	15·47	76·21
21·14	78·86	18·68	88·36
23·51	76·49	24·90	105·91
24·82	75·18	26·81	108·02

Bray's standard union No. 7 burner was used in determining the candle power of all mixtures. This burner was not adapted to the poorer mixtures, and probably not to the very highest; but it was employed for all, as enabling one to make a better comparison of results. In most cases, the consumption was from 4 to 5 feet per hour—the results being corrected to 5 feet.

While the figures obtained may be considered as approximately correct, it is probable that the irregularity would have been greater with mixtures containing smaller percentages of acetylene; and the method was therefore so modified that in all other tests the mixtures were analyzed.

After effecting the mixture of the gases, photometric tests were made in duplicate; and the sample of gas for analysis was taken between the tests.

A second series of tests with uncarburetted water gas were made in the manner described, the results of which are given in the next table:—

TABLE II.—*Mixture of Acetylene and Uncarburetted Water Gas.* (*Mixtures Analyzed.*)

Acetylene. Per Cent.	Water Gas. Per Cent.	Candle Power for 5 Cubic Feet of the Mixture.	Illuminating Value of Acetylene.
14·36	85·64	1·14	7·94
18·38	81·62	11·65	63·38
24·66	75·34	29·45	119·42
27·84	72·16	40·87	146·80
38·00	62·00	73·96	194·63

Tests with Carburetted Water Gas.—The gas used in these experiments had received its enriching material from naphtha, and originally had an illuminating power of about 28 to 29 candles. Gas of this quality usually contains from 14 to 16 per cent. of hydrocarbons absorbable by bromine. The sample was compressed to 16 atmospheres; the method of compression being such that no condensed products could accumulate in the cylinder.

The mixtures with acetylene were not made until considerable gas had been used for other purposes, and the pressure had thereby been reduced to about 6 atmospheres. It then had an illuminating power of 13·5 candles by the flat-flame burner, equivalent to 17 or 18 candles by Sugg's "London" Argand.

It is an interesting fact that the compressed gas, having an illuminating power of 13·5 candles, contained 13·2 per cent. of gases absorbable by bromine; showing that a very serious loss in illuminating power is caused by the condensation and removal of a comparatively small proportion of the heavy hydrocarbons, doubtless composed to a great extent of benzol vapour. The gas was mixed with acetylene, and the mixture tested in the manner already described. The following results were obtained:—

TABLE III.—*Mixture of Acetylene and Carburetted Water Gas.* (*Mixtures Analyzed.*)

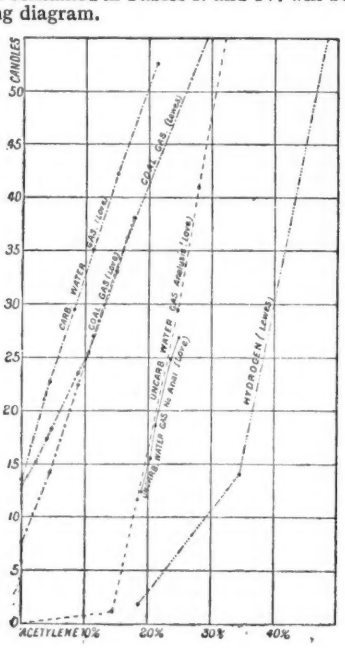
Acetylene. Per Cent.	Water Gas. Per Cent.	Candle Power of Water Gas.	Candle Power for 5 Cubic Feet of the Mixture.	Illuminating Value of Acetylene.
4·50	95·50	13·5	22·69	217·78
8·40	91·60	13·5	29·54	204·40
11·21	88·79	13·5	35·05	205·71
15·06	84·94	13·5	42·19	203·98
21·44	78·56	13·5	52·61	195·90

Tests with Coal Gas.—The gas used in these experiments was said to have had originally an illuminating power of 16 candles; but, after compression to 16·5 atmospheres, the candle power was found to be 7·59 candles in the flat-flame burner, and 10·91 candles in Sugg's "London" Argand. It contained 4·62 per cent. of hydrocarbons absorbable by bromine. The mixtures with acetylene were analyzed and tested photometrically the same as in the tests with water-gas mixtures. The results are given in the following table:—

TABLE IV.—*Mixtures of Acetylene and Coal Gas.* (*Mixtures Analyzed.*)

Acetylene. Per Cent.	Coal Gas. Per Cent.	Candle Power of Coal Gas.	Candle Power for 5 Cubic Feet of the Mixture.	Illuminating Value of Acetylene.
4·49	95·51	7·59	14·16	153·90
9·08	90·92	7·59	22·44	171·14
11·28	88·72	7·59	26·98	179·52
17·62	82·38	7·59	38·02	180·34

The results contained in Tables I. and IV. will be found in the accompanying diagram.



Since the preparation of this paper, I have seen some results obtained by Professor Vivian B. Lewes on the enriching value of acetylene when added to 13-candle coal gas. These results will also be found on the diagram, together with similar figures obtained by the same writer with mixtures of acetylene and hydrogen.

In order to form some idea of the cost of enrichment by acetylene, let us assume that the carbide can be had for $20 per ton, and that a ton will yield 10,000 cubic feet of acetylene. Perhaps the first use for cheap acetylene would be for the enrichment of uncarburetted water gas. From Table II. it appears that such a mixture, having an illuminating power of 25 candles, would contain 23 per cent. of acetylene; or the enriching material for 1000 cubic feet of such gas would cost 46 c. —a figure which is prohibitory. In similar manner, if acetylene were added to coal gas of 7·6 candles to bring it up to 20 candles, the enriching material would cost 15 c. per 1000 cubic feet.

It has been proposed to mix the acetylene with air, and consume it in small burners. But the danger of forming an explosive mixture is such that this plan will probably find little favour. The most hopeful outlook for acetylene as an illuminant seems to be its use, without admixture, in burners consuming from 1 to 1·5 cubic feet per hour.

Gas for Railway Lighting.—Speaking at the half-yearly meeting of the Cambrian Railways, the Chairman (Mr. J. F. Buckley) bore testimony to the cheapness of gas as compared with oil for lighting railway carriages. He said, with respect to traffic expenditure, fuel, lighting, &c., showed an increase of £309; but this was primarily due to the new gas lighting in their carriages. Gas was cheaper than oil; and, in the long run, when they had all their carriages fitted for gas lighting, they would derive great benefit from the change.

Patents in the Past Year.—The twelfth report of the Comptroller-General of Patents states that, though the number of applications for patents in the year 1894 continued upon an ascending scale (being 270 more than in the previous year), this increase was considerably less than that of the normal average of the preceding seven years. The number of applications for patents has increased from 17,176 in the year 1886 to 25,386 in 1894; being at the rate of 48 per cent. It is interesting to notice a large increase in the number of applications for patents from Ireland last year as well as in 1893; while among the colonies, the largest proportionate advance is shown by Queensland. As respects similar applications from Foreign States, Belgium, Germany, and Sweden had the largest increase; the number of applications from France having remained curiously stationary during the past ten years—being 788 in 1884, and only 799 last year. The applications from the United States, which reached the number of 2597 in 1890, have fallen off since that date, and amounted to only 2017 in 1894.

The Gas, Electric Lighting, and Water Companies' Directories and Statistics for 1895 have just been issued by Messrs. Hazell, Watson, and Viney, Limited, of Creed Lane, E.C. They appear this year with the matter presented in what the proprietors regard as the "far more clear and convenient paragraph form," instead of the tabular arrangement to which we have been accustomed. In fact, the style adopted is that of Brown's "Directory of American and Canadian Gas Companies." This alteration, besides giving all the information in regard to a company at one reference, has allowed of the combination of the whole of the particulars relating to gas and electric lighting in one volume; leaving those relating to water companies for a second volume. But, of course, the two volumes are to be had bound together. The gas and electric lighting sections furnish details, made up to the 25th of March last, in regard to about 1700 gas undertakings, of which 1500 are in the United Kingdom; and also as to 75 electric light undertakings. The book contains, as usual, reviews of the leading events of the year, as well as lists of Associations of Engineers and Managers of gas, water, and electric light undertakings at home and abroad.

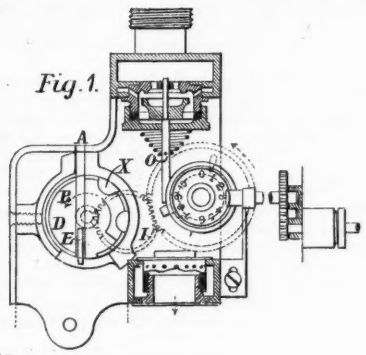
Action of Sea Water upon Concrete.—Professor Brazier, of the Aberdeen University, has made some experiments upon the action of sea water upon concrete, of which the following is a summary: Indurated Portland cement was exposed to the action of sea water and to solutions of sulphate and chloride of magnesium; and in about three months, it was found that in all cases nearly the whole of the magnesium was precipitated as hydrate, and that lime from the cement was dissolved, partly held in solution, and partly precipitated as sulphate and carbonate of lime. It is stated by Mr. J. Pattinson, County Analyst for Northumberland, with reference to an analysis of disintegrated concrete, that the chemical action between sea water and cement actually took place. The lime of the cement precipitated (as hydrate) the magnesia of the magnesium chloride and sulphate contained in the sea water, with the consequent formation of calcium chloride and sulphate. If the cement or concrete is continually brought into contact throughout its substance with fresh portions of sea water, there will be a continued deposition of hydrate of magnesia and probably sulphate of lime, and removal of lime; necessarily resulting in the disintegration and destruction of the concrete. Mr. E. Carey has shown that the addition of 5 per cent. of sulphuric acid to the water with which the cement is gauged, reduces its strength in seven days to 27 per cent. of that of neat cement.

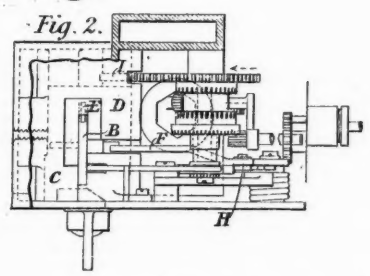
REGISTER OF PATENTS.

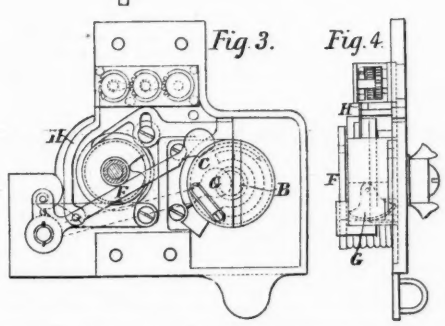
Prepayment Meters.—Thorp, T., of Whitefield, Marsb, T. G., of Manchester, and Haynes, J., of Liverpool. No. 13,022; July 5, 1894.

This invention consists in improved mechanism for receiving and delivering the coin and actuating the gas-valve and indices of coins inserted, and in the manner of attaching the same to a prepayment meter, with the object of simplifying the mechanism and rendering it "more readily applicable to existing meters, without disarranging the gas-consumption index connected to them."

Fig. 1 is a vertical section through the prepayment mechanism; fig. 2, a plan, with the top and valve removed; fig. 3, a view of the front plate, with parts attached thereto, as seen from the back; and fig. 4, a side view of fig. 3.







The prepayment mechanism is in a casing attached to the upper part of the meter, at the side of the usual consumption-index. The coin is inserted through a slit A into a slot B, in a hollow cylinder made in parts—one part fixed to the front plate of the casing, and the other part to the side of the back plate. The slot B is placed to one side of the centre-line of the cylinder, and is made about as long as the diameter of the coin to be used for prepayment. The bottom side of the cylinder has a wider slot, extending for nearly the full length of the bottom side. Into the cylinder are placed two solid coin-carrying cylinders C and D. The front cylinder has fixed to it a spindle, which passes through the front plate of the meter, and has a winged handle or button fixed upon it, by means of which the cylinder can be turned. The back coin-cylinder D is formed with a projecting rim, partly cut away for the greater part; so that, while the latter rests against the face of the front cylinder C, there is a space between the cylinders for the rest of the circumference. The cylinder has a pinion fixed upon its back end, which butts against the back plate, and holds the cylinder in position in its longitudinal direction. Each cylinder has a slot in its face opposite the other; the slots being to one side of the centre, and coinciding with the slot B in the top of the hollow cylinder. Thus a coin dropped into the latter passes into the slots in the cylinders C and D, when their position coincides with the upper slot. In order to prevent the coin dropping through, a tumbler lever E is provided. On the insertion of a coin of the prescribed size, this pushes back the upper end of the lever E, and lifts one end up into the cylinder, so that the lever forms a rest for the coin. A coin of smaller size will simply drop through the slot into a receptacle below.

When a correct coin has been inserted, it will connect the cylinders C and D, or act as a driver; so that when the front cylinder is turned, the back cylinder is turned with it by means of the coin till the latter is expelled after about half a revolution, which is done in a similar manner to that described in patent No. 7899 of 1894. For this purpose, the lever F is fulcrummed on a stud, on the front plate. This lever is pressed downwards by a spring of the meter, and extends into the space between the coin-cylinders through a slot in the outer cylinder. When the cylinders C and D are in their starting position, the end of the lever F rests in the notch X formed in the projecting rim part, and holds the back cylinder D in this position, till a coin is inserted, and the handle turned. The lever then rides on the rim till one end slips from under it, after the cylinders have made about half a turn. The lever is then pulled down by the spring upon the stop into the position shown in dotted lines on fig. 3, and pushes the coin out of the slots into the coin-receptacle below. This arrangement prevents frauds by the insertion of coins smeared with wax or other sticky substance, with the object of turning the mechanism round several times with one coin.

When the coin has been expelled, the connection formed by it between the front and back coin-cylinders C and D is dissolved; and the back cylinder D would remain in the position it then occupies while the front cylinder is turned further round, unless meantime another connection between the cylinders is made. This is done in the following manner: In a slot in the cylinder C, a catch or pawl G is mounted on a pivot, and is in the position shown in fig. 4, when the cylinder is placed in the coin-receiving position. The cylinder is recessed at the front; and in the recess a raised segmental rim is formed on the front plate, the inclined end of which the nose of the catch G encounters before the cylinder has made half a turn. The catch G is thereby turned backwards, and the other end of it is protruded from the face of the cylinder, so that it catches behind the abrupt end of an inclined projection formed in the face of the back cylinder D. This cylinder continues to be turned by the front cylinder after the coin has been ejected, until the end of the lever G drops off the raised segmental rim; while at the same time the lever F, which has been raised by the projecting part of the rim next to the slot, drops into the notch X, and holds the back cylinder in the starting position, so that it makes exactly one revolution. When the revolution is completed, the nose of the catch G drops off the rim by its weight, and assumes the position indicated in fig. 4.

By these means, the two cylinders are constrained to make an entire revolution, after the insertion of each coin, before another coin can be inserted. The number of revolutions and coins paid in are registered on an index, by attaching a pawl H to the lever F, so as to act on a ratchet-wheel, and advance it by a tooth for each rotation of the coin-cylinders.

The mechanism for opening the inlet-valve for the gas, by the rotation of the coin-cylinders, and closing it by the meter when the quantity of gas paid for has been consumed, may be arranged to act in a positive manner as follows: Upon the end of the back cylinder D is a pinion meshing with a carrier-wheel I, which meshes with a spur-wheel, mounted loosely upon a stud, and formed with, or attached to, a crown-wheel, or an equivalent bevel-wheel. Opposite to the wheel, another equal crown-wheel K, or equivalent bevel-wheel, is likewise loosely mounted upon a sleeve N on the stud, and formed with a boss upon which another crown-wheel is detachably fixed in the position shown in fig. 2. This wheel can be changed for others having a greater or less number of teeth, for the purpose of varying the quantity of gas supplied for each coin. The crown-wheel meshes with a pinion L, formed on a spindle supported in brackets. In some cases it carries a spur-wheel, gearing with a pinion M upon a shaft, passing through a stuffing-box soldered to the case of the prepayment mechanism. The shaft is rotated, through a worm and worm-wheel, from the shaft which drives the usual consumption-index of the meter. The long loose sleeve N is formed with a boss between the crown-wheels, into which is screwed a stud, upon which a spur-wheel is mounted, meshing with both crown-wheels. The stud extends beyond the wheel; and the valve is so placed that its stem O is encountered by the stud when the sleeve is turned in the opposite direction to that indicated by the arrow in fig. 2.

The action of this arrangement of mechanism is as follows: When the handle is turned after the insertion of a coin, the back cylinder D is turned in the manner already described, and through the wheels turns the crown-wheel in the direction shown by the arrow in figs. 1 and 2. The crown-wheel K is held by the pinion L, as this pinion is not rotated through the gearing described while no gas is consumed, or rotated very slowly while gas is consumed. In consequence, it is rolled along the wheel K, and the stud moves through half the arc described by a tooth of the wheel, and in the same direction, away from the valve-stem O. The valve is so arranged that it opens by the gas pressure in the main, or its weight or a spring placed round the spindle, and consequently gas enters the meter. For each additional turn of the handle and coin inserted, the stud moves through a further equal arc away from the valve-spindle. As the gas is consumed, the crown-wheel K is rotated, through the gearing described, in the opposite direction to that in which the other wheel is rotated on the insertion of a coin, while this latter wheel is kept stationary by the back cylinder D. In consequence, the sleeve N and stud are turned in the opposite direction until, when the gas paid for has been entirely consumed, the stud encounters the valve-spindle O, and, lifting it, closes the inlet-valve.

Obtaining Cyanogen or Its Compounds from the Gases resulting from the Dry Distillation of Substances of Organic Origin.—Drehschmidt, H., of Berlin. No. 16,149; Aug. 24, 1894.

This invention refers to a process for obtaining, on an industrial scale, cyanogen or its compounds from the gases given off in the dry distillation of nitrogenous bodies of organic origin—including all kinds of fossil coal (whether pit-coal, lignite or bituminous shales), turf, or wood.

It is well known, the patentee remarks, that gas obtained from coal—whether in the manufacture of illuminating gas or coke—contains, after the elimination of the tar vapours, other impurities, carbonic acid, sulphuretted hydrogen, and ammonia, together with a small amount of cyanogen compounds (hydrocyanic acid). Gas yielded by turf or wood contains but little sulphuretted hydrogen and ammonia, but a large quantity of carbonic acid. To isolate and recover the cyanogen from such mixtures of gases, the well-known property of cyanogen, of forming double compounds with the alkalies or alkaline earths in the presence of a second base, has been utilized; and these double salts are decomposed with difficulty or not at all by sulphuretted hydrogen or carbonic acid, while all simple cyanogen compounds undergo a more or less easy decomposition under the action of these two gases. The tendency of cyanogen to form such stable double

compounds is so great that it or its compounds (hydrocyanic acid), acting on a suitable heavy metal—such as iron, manganese, zinc, &c.—in the form of oxide, carbonate, or sulphide, in the presence of oxide, carbonate, or sulphide of potassium, sodium, ammonium, magnesium, calcium, or other alkaline earths, are able actually to set free carbonic acid or sulphuretted hydrogen, and to form double cyanogen compounds of a heavy metal and an alkaline metal or alkaline earth metal. Attempts have been made to bring about the formation of such double cyanogen salts, with a view to the separation and recovery of the cyanogen in the gases of combustion, by passing the gases through solutions of the oxides, carbonates, or sulphides of the alkalies (such solutions containing also the oxides, carbonates, or sulphides of the metals referred to), by using a fluid in which, with the metallic compounds alluded to, there were present in suspension the oxides or carbonates of magnesia, chalk, or other alkaline earths. It was thought impossible to obtain by any other mode of procedure the intimate simultaneous contact of the cyanogen with the alkali or alkaline earth base and the metallic base, which is essential to the rapid and certain conversion of the whole of the cyanogen into the desired stable double cyanogen compound.

In this process, however, the disadvantage is experienced that it is difficult to pass gases through fluids in which solid materials are, and must be, kept in a state of suspension, and complicated apparatus is necessary to effect it; while, on the other hand, gases can be passed with facility through solid materials which are porous and absorbent, as is done on a large scale in the purification of illuminating gas by masses of oxide of iron. It has not hitherto been considered possible—nor has it, indeed, been possible—to effect by this (dry) method the combination of cyanogen in large quantity and in a concentrated form. It has been thought that, with dry materials, it only happens to a slight extent that the cyanogen comes into contact with the metal and the alkali simultaneously and everywhere; and it has been further thought that, when solid materials are employed, the cyanogen compounds as they are formed enclose the remaining portions of the mass, and protect it against further action.

The object of the present invention, therefore, is to eliminate all the above disadvantages, and so to effect the isolation and recovery of cyanogen from gases by employing solid porous masses in contrast to the previously used methods consisting in the use of fluids. To effect this object, the solid materials to be employed must be so prepared that the gas may obtain access to all parts of the mass at as nearly as possible the same time, and that the gas shall encounter at all points simultaneously the compounds of the light and the heavy metals in the proper proportions. If it were sought to fulfil the required conditions by preparing the mass which is to form the cyanogen compound, by steeping the oxide or carbonate of the metal with an alkaline solution, it would never be possible, the patentee points out, for more than a proportionately small quantity of alkali to be taken up, if the mass be intended to remain solid. The mass would, moreover, become hygroscopic, and but slightly penetrable by the gas. The alkalies alluded to above would, therefore, according to the present invention, be of necessity excluded when it was desired to form a solid absorption mass. But even for the other substances, the process of steeping would not be available; for, in the form of their oxides or carbonates, they are considerably less soluble than the alkalies, if soluble at all, indeed, so that the proportion of light metal taken up by the materials containing the heavy one would be still smaller than when the alkaline solution was used, nor would a mechanical mixture of the materials alluded to afford the desired result. Not even as the result of the most intimate mechanical mixture would the separate particles of the various substances lie closely together, and be evenly distributed to an extent which would secure that at the same time the cyanogen should come into contact with the various substances necessary to the formation of a double cyanogen compound in the proportions required. Moreover, the porosity itself must be of such a kind as to allow the gas to come into absolute molecular contact with the solid material at all points, and to prevent a protective casing from enclosing considerable portions of the mass, to the exclusion of further chemical action. This object cannot be attained by any process of mechanical mixture.

According to the present invention, the isolation and recovery of cyanogen from gases may best be effected by bringing the gases in question into contact with solid materials, in which the oxide (anhydrous or in the form of hydrate or of carbonate) of the light metals referred to above—*i.e.*, metals of alkaline earths, such as magnesium, calcium, barium, strontium—are present in the required proportion of from one to two molecules, in a mixture with one molecule of the oxide (anhydrous, or in the form of hydrate or of carbonate) of a heavy metal, such as iron, manganese, or the like, which form, with the metallic salts referred to, and cyanogen, double compounds, which are not decomposed by sulphuretted hydrogen or carbonic acid. The materials alluded to must, however, be mixed by chemical means, since mechanical methods are useless, so that the molecular contact may be so intimate, and the porosity so perfect, as to afford the gas access as complete as possible to every particle of the mixture. The chemical mixture, which thus brings about the perfect homogeneity of the material, and the most thorough porosity possible, may be effected by precipitating the oxides (anhydrous, or in the form of their hydrates or carbonates) of the heavy metals characterized, in the presence of, or in association with, the oxides of the light metals of the alkaline earths; and this may appropriately be effected by means of the oxides or carbonates of the alkaline or alkaline earth metals. Oxides of the light metals may also be precipitated in the presence of oxides or carbonates of the heavy metals from their solutions, by means of oxides or carbonates of the alkaline metals, so that the precipitation may take place, as it were, inside the masses of carbonates or oxides of the heavy metals.

The mode of manufacturing the porous mass may be further explained by means of the following examples:—

(1) The pulverized oxides (as such, or in the form of hydrates or carbonates) of the light metals of the alkaline earths are suspended in water, and solutions of heavy metals—as iron, manganese, zinc, or the like—allowed to flow with constant stirring; the heavy metals being those which, in combination with cyanogen and the light metals mentioned, form double salts, which are not capable of being decomposed by sulphuretted hydrogen or carbonic acid. By the chemical action of the oxide of the light metal of the alkaline earth, the oxides (*i.e.*, as such, or in the form of their hydrates or carbonates) of the heavy metals are precipitated in a state of fine division, and in the most intimate molecular contact with the portion of the oxide or carbonate of the light metal which is present in excess of the quantity required to bring about the chemical reaction referred to. The proportions present in the mixture may be adjusted so that one molecule of metal in the oxide of the heavy metal is present to one or two molecules or atoms of the oxide of the light metal of an alkaline earth. The oxide or carbonate of the light metal which takes part in the reaction may also be replaced by an equivalent amount of a precipitating material which has the same action as alkali or alkaline carbonate. The salts of the metals must not be such that the acid they contain unites with the oxides of the light metals to form insoluble compounds which have no affinity for cyanogen—*e.g.*, sulphuric acid with oxide of calcium. The precipitate resulting consists of the oxides or carbonates of the light and heavy metals, and is separated from the fluid, washed, dried, and powdered.

(2) The oxides or carbonates of the light metals aforesaid may also be treated with a solution of the salts of the heavy metals, until the insoluble mass has the composition mentioned in paragraph No. 1. In this case, too, the metallic salt selected must be such a one as was referred to as regards the acid contained in it. The resultant mass is then, as already described, washed, dried, and powdered. The mass described differs from Laming's mass, employed for the elimination of sulphuretted hydrogen from gas, inasmuch as it has a different composition, containing neither chlorides nor sulphates.

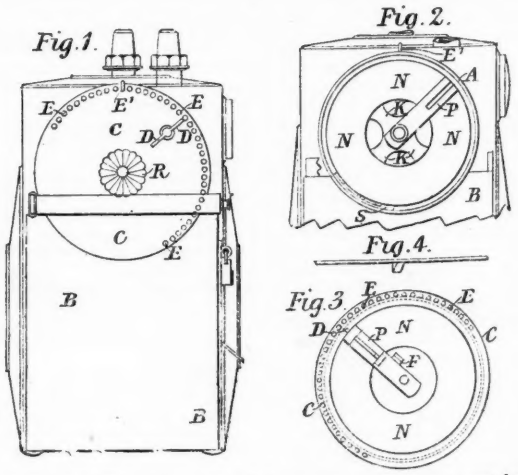
(3) A solution containing the salts of the light metals, and those of the heavy metals as well, is allowed to flow into one containing the oxides or carbonates of the alkalies, or, if magnesium salts be employed, into milk of lime. The kind of salt of the heavy metal, the composition of the precipitate, and the further treatment of the latter, are the same as those described in paragraph No. 1.

(4) The oxides of the heavy metals may be first of all mixed with a solution of those of the light metals, and then, in order to separate out the oxides (in the specified form, such as oxides, hydroxides, carbonates) of the light metals, be further treated with a solution of oxide or carbonate of an alkaline metal; the remaining conditions, and the treatment of the resultant product, being as above. The mass thus obtained, in a state of the greatest attainable freedom from constituents which have no action upon cyanogen, is so homogeneous and so perfectly porous, that the gas is able to act upon every portion of the mass, and finds at the same time, at every point, the proper proportions in the mixture. The mass is utilized for the absorption and isolation of the cyanogen in a way exactly similar to that in which the ordinary gas-purifying materials are made use of, by spreading it out upon wooden hurdles or gratings in cleansing chambers, and passing the gas over and through it. The absorption of the cyanogen, says the inventor, is both rapid and certain, in spite of the fact that both sulphuretted hydrogen and carbonic acid are present in the gas. If the mass be saturated with cyanogen, or when the absorption of it has ceased, the mass is removed and treated in any way to obtain the cyanogen compounds.

Coin-Freed Apparatus for the Sale of Gas in Fixed Quantities.—Glover, R. T. & J. G., of St. John's Street, Clerkenwell, E.C. No. 25,272; Dec. 29, 1894.

This invention has for its object "arranging upon the exterior of a prepayment gas-meter a plate in such a manner that it can be set to allow the coin-operated mechanism to be moved a greater or less distance to supply a greater or less quantity of gas to the consumer; the actual amount to be obtained for a given coin being visible to the consumer by the exterior position of the changing plate."

Fig. 1 is an elevation of the arrangement applied to the side of a dry meter. Fig. 2 is part of the meter side, with the external cover removed to show the coin-receiver shield. Fig. 3 is a back view of the cover and shield, showing more particularly the position of the limiting stop against which the coin-receiver abuts. Fig. 4 is a plan of the cover. Fig. 5 represents a sectional elevation of the till, and a view of the notched and ratcheted plate, as seen when the cover and coin-receiver shield are removed. Fig. 6 is a front elevation of the



apparatus and till at the side of the meter. Fig. 7 is a part front sectional elevation of the apparatus, with the coin in position just at the moment of discharge into the till.

The apparatus A is arranged immediately above a money-holder

or till B; and both are attached to the side of the meter. The cover or price-changer C is a round, flat plate, having a slot D, through which a coin can be inserted. The circumference of the price-changer is marked off by holes E, so that, by placing a given hole over the hook E^1, the coin-slot D and stop F behind the price-changer are fixed in the position required to control the degree of movement of the mechanism by the consumer, and allow a quantity of gas, corresponding to the number of the hole in which the hook appears, to be supplied. The price-changer can be moved to allow any quantity—preferably from 1 to 50 cubic feet—of gas to be supplied; and it is secured in the desired position by means of a hinged clasp or binder and a seal.

Fig. 5.

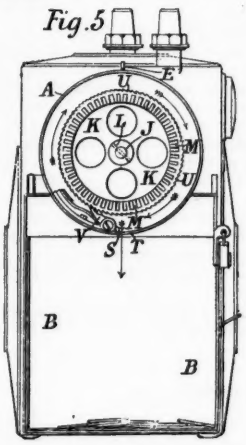


Fig. 6.

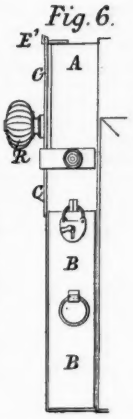
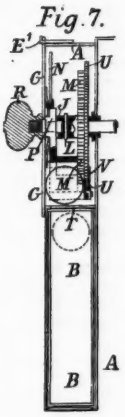


Fig. 7.



The central spindle J is connected to any known device operated by the ordinary meter mechanism for stopping the supply of gas—for instance, such a device as that described in patent No. 8327 of 1894. It may be operated by a plate K, mounted upon the spindle J, projecting from the meter-case into the box A; and it is secured thereto by a pin L or other means—the plate having side notches M facing the price-changer. Between the plate K, and immediately behind the price-changer, is a shield N, to which is secured a coin-receiver or pocket P, into which a coin is passed through the slot D of the price-changer to rest in one of the notches of the plate, and so cause it and the coin-pocket to move together when the handle R is turned. The handle is screwed upon the centrally and outwardly projecting stem of the coin-receiver. The shield N serves to prevent the insertion of a coin through the slot D so long as the pocket P is out of coincidence with the slot. The shield N is loosely mounted upon the extremity of the spindle J, so that, when no coin is inserted, the shield and coin-receiver can be turned without affecting the notched plate.

The rotative movement of the pocket P and shield N in the direction of the arrows (fig. 5), is limited by a part of the coin-receiver striking the stop-plate S, which is placed contiguous to the orifice T at the bottom of the box A, through which a coin, if one be in the coin-receiver, falls to the money-till below. The rotative movement in the reverse direction is, of course, variable, according to the position of the price-changer, as before explained; but whatever the latter's position may be, the return movement is arrested by contact with the projecting stop F, against which a part of the coin-receiver P abuts.

The distance between the stop F and stop-plate S, by determining the amount of rotative movement imparted to the spindle J when a coin is inserted, regulates the degree of movement of the valve-opening mechanism, and so allows a proportionate quantity of gas to be supplied before the valve is closed by the action of the meter mechanism.

Ratchet-teeth U, into which a spring pawl V engages, are circumferentially cut in the plate K, to prevent any back movement.

To alter the quantity of gas to be supplied for a given coin, it is only necessary to break the seal, and swing the binder back upon its hinge, unscrew the handle R, unhook the price-changer, turn it, place the hole corresponding to the number of cubic feet it is desired to supply in engagement with the hook E^1, and then fasten the price-changer by replacing the handle and binder. A spring is inserted between the price-changer and the coin-pocket P, to retain the latter in any position; and an arm on P prevents the coin from falling when the coin-pocket is turned vertically upwards.

Incandescent Gas-Mantles.—Knöfler, O., of Charlottenburg, Germany. No. 11,038; June 4, 1895.

The patentee proposes to prepare the mantles for incandescent gas-burners of threads which have, previous to being woven into the usual cone-shaped hoods, been impregnated with the oxides or salts required to give them their essential characteristics—instead of (as has hitherto been usual) dipping the mantles, after being shaped, into the solutions of "rare earths."

Water-Meters.—Lake, H. H.; communicated from F. Lux, of Ludwigshafen-on-the-Rhine. No. 11,224; June 7, 1895.

This invention relates to means for adjusting wheel water-meters in such a way as not to impair their efficiency and sensitiveness.

In the wheel water-meter described in the specification, the water freely enters the measuring chamber in a tangential direction, thereby imparting a rotary movement to the shaft of the measuring-wheel. By means of curved channels provided in the inner top portion, and by similar channels in the bottom of the casing, the measured water is led towards the shaft, and caused to pass through an aperture and openings to the place whence it is taken for use—the channels are all of uniform cross section throughout. In being driven from the peripheral portion of the measuring casing towards the aperture named above, the water, by its swell, acts to disturb the free movement of the measuring-wheel; and it is obvious that, by allowing a portion of the measured water to escape into the regular discharge conduit near the circumferential portion of the measuring casing, the measuring-wheel may be caused to rotate more freely, and that the result of the measurement may thus be altered. To this end, holes are bored in the raised portions formed by, and between, each two channels; and above the holes is provided a ring, resting in a correspondingly shaped annular recess, and provided with openings corresponding with the holes referred to above. By means of an arm or index provided on the ring, the latter may be rotated more or less, so as to alter the positions of the openings with regard to the holes; and the latter may thus either be closed entirely or opened to any desired extent. It will thus be seen that by a suitable adjustment of the position of the "gauging ring," a portion of the measured water, after having taken part in the movement of the winged measuring-wheel, may be discharged into the conduit without being forced through the aperture, and without (on its way to the aperture) hindering the movement of the winged measuring-wheel. If the wheel-train of the counting mechanism is so arranged that the result of the measurement would differ by about 10 per cent., this may be easily corrected by moving the arm or index, and thereby turning the gauging-ring, and retaining it in its position by the eight feet forming the connection between the chamber of the counting mechanism and the measuring casing.

Self-Starters for Gas-Engines.—Green, W. H., of Northampton. No. 11,493; June 12, 1895.

This invention refers to (1) means for allowing a portion of gas to enter the engine cylinder (when the engine is at rest), from the gas-supply pipe; (2) an improved igniting valve or hollow spindle, for firing the charge of gas or vapour; and (3) a trigger arrangement for keeping the valve shut and out of action when the engine has once started. The hollow spindle has a collar formed thereon, the upper side of which has a face, and acts as a stop to prevent it rising too high. There is also a device by which the valve is instantaneously closed when desired to be put out of action, and also for dispensing with a cock, which (the patentee remarks) quickly deteriorates by the gas and explosive force acting upon it.

Automatic Lighting Devices for Gas-Stoves.—Gurd, W. J., of London, Canada. No. 11,550; June 13, 1895.

According to this invention, lighter-tubes are connected with the gas supply-pipe, and extend through the stove to positions close to the several burners. These tubes either have a continuous row of perforations or are provided with a continuous longitudinal slit of such size as to admit a slight escape of gas along the tube, which, when ignited at any point, causes a flash of flame along the entire tube, and thus automatically light the several burners in contact with it. In order that the escaping gas from the lighter tubes may be ignited automatically, and also immediately upon the escape of gas after the tubes have been supplied, so as to prevent waste, there is a burner supplied from the gas-pipe adapted to carry a pilot-light, with which the entire system of lighter-tubes has communication, in such manner that the gas from all, or only a portion of the system, as may be desired, may be ignited, and thus light one or all of the several series of burners.

APPLICATIONS FOR LETTERS PATENT.

14,363.—Redman, T., "Construction and method of supporting street-lamps and the like, and the lighting of the same." July 29.

14,385.—Dürr, F., "Gas and oil engines." July 29.

14,403.—Jahnsson, J., "Electrical gas-igniting devices." July 29.

14,404.—Farkas, A., "Incandescent gas-burners." July 29.

14,460.—Howell, H., "Apparatus for the production of combustible gas." July 30.

14,605.—Shepherd, R. C., "Water motor." Aug. 1.

14,617.—M'Euen, C. H., "Treatment of kerosene shale for the production of hydrocarbons and other products therefrom." A communication from J. C. Alexander and R. C. Beveridge. Aug. 1.

14,666.—Ross, F. E., "Utilizing the exhaust gases from internal combustion engines, such as gas and oil engines." Aug. 2.

14,685.—Kühne, H., "Ascertaining the heating power of solid combustibles." Aug. 2.

14,755.—Cordingley, I. and T. W., "Regulating the speed of gas and oil engines." Aug. 3.

14,797.—Skwirsky, J., Erintchek, A., and Erintchek, I., "Gas, oil, and similar engines." Aug. 3.

The Gas Coal Contracts of the Halifax Corporation.—The Gas Committee of the Halifax Corporation have accepted tenders for 57,000 tons of coal, at prices ranging from 6s. 9d. to 8s. 3d. per ton.

Stokers' Hours at the Stockton Gas-Works.—At the last meeting of the Stockton Town Council, an attempt was made to get from the stokers employed at the gas-works an expression of opinion as to their hours of labour. The matter came up on a motion by Mr. Vickerson that a ballot be taken as to whether or not the men were in favour of an eight-hour shift. Mr. Lee characterized the proposal as "undue interference" between the Gas Manager (Mr. W. Ford) and his workmen. He said he objected to agitation being forced upon the men to say they were in favour of an eight-hour shift. Mr. Darbyshire thought the motion had been brought forward simply to gain cheap popularity at the expense of struggling ratepayers. Mr. T. B. Watson also deprecated interference by the Council. He said the men had been extremely well treated by Mr. Ford, who had over a certain number of years raised their wages from 24s. to 37s. 6d. per week. The men did not really work more than five hours out of the eleven they were in the works. Mr. Vickerson said the men were twelve hours at the works; but, whatever hours they actually worked before the retorts, the men were far too long on the premises. The motion was rejected by 16 votes to 11.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

Mr. M'Gilchrist on Himself.

SIR,—Turning over the pages of the JOURNAL this week, I was attracted by the name of Mr. M'Gilchrist. I suppose I am not singular in desiring to see what he has to say on any subject; he speaks equally well upon all. I was, however, amazed to note the kind of language he had given vent to. To me it looked like another invasion of Scotland, to find a distinguished representative of that country adopting the vulgar slangy expressions of the South and West. I have known men who have been out in South Africa for nineteen years without a break, whose pride and boast it was that they had never dropped a single word or even an accent of the language they had learned in Bonnie Scotland, neither had they adopted one of any other country—they were no more capable of speaking English than they were on the day they left home. How these men would have been horrified to have heard that speech of Mr. M'Gilchrist's. However, it had the effect of inducing me to read through the whole of the paper and the discussion; and after doing so I come to the conclusion that he must have absorbed some of the potential heat that is so freely distributed throughout the paper, and (labouring under the consequent excitement) felt a desire to get someone squashed or otherwise pulverized.

Mr. Young is evidently regarded as a giant in the North, and is looked up to accordingly by the rank and file who bask in the resplendent glory of the rays which emanate from his great luminosity. I am sure it must be a source of regret to them all that he bears the common cosmopolitan name of Young. If only he was a M'Something or other, that he might proclaim his nationality every time he signed his name, how much better it would be. It was this tower of strength that Mr. M'Gilchrist desired to direct or turn on to some person or persons for the gratification of his own feelings. I have no idea who the parties are who have talked the "rot." I do not know the class of people Mr. M'Gilchrist talks to or listens to; but as one cannot have greatness in the best sense without more or less wisdom, his purpose was frustrated. Mr. Young absolutely declined to be appointed pulverizer-in-chief, and so ignored the question. Even after a reminder from Mr. M'Gilchrist, Mr. Young would not "face the music," but showed his diplomacy by a beautiful bit of hedging. I admire Mr. Young.

There is a paragraph in Mr. Irwin's letter in the same issue of the JOURNAL, in which he says that he has never been able to get more than 14-candle duty from the Manchester 20-candle gas, when burnt with a No. 4 Bray union-jet (the burner commonly used). It is the second paragraph; and it is significant. I commend it to Mr. M'Gilchrist's careful consideration, as it bears upon the subject. If he would only devote a little of his valuable time to a serious consideration of the question, I have a notion that it would lead to a little *less* "rot" being talked upon the subject.

I quite agree with Mr. MacPherson, who modestly claims that he and Mr. Young were twenty years ahead of Professor Lewes and Mr. Lewis T. Wright in the class of investigation they have been recently engaged upon, and occupying so much of our time with. That the two latter gentlemen have acted improperly, goes without saying. The least they could have done before wasting so much of their own and other people's time was to have read up the ancient proceedings of the North British Association. However, they have been properly snubbed; and I trust it will be a lesson to them. If ever they have the audacity to again appear before the public, I hope that their own good taste will suggest to them that their first duty to Mr. MacPherson, Mr. Young, and the public is to apologize for their misdoing.

Altrincham, Aug. 3, 1895. WM. CARR.

"An Evil to be Checked"—Politics and Gas Management.

SIR,—Your article in the last issue of the JOURNAL on the above subject has but one fault, and it is that you err on the side of mercy. Allow me to state my experience in connection with three vacancies that have been advertised by Gas Committees within the past twelve months.

In the first case—where, of course, canvassing was strictly prohibited—your correspondent was in due course informed that his name was retained on the first "short leet" drawn out (ten candidates). Having friends on the Committee, he was—up to a certain point—kept well informed as to the progress of events; and he had eventually a private, but undoubtedly correct, intimation that he was on the reduced short list of five candidates, and was to be sent for to a personal interview. This was at the time quite understood. Later on the Secretary to the Committee wrote, also stating that the name was retained on the final list. Yet we find the vacancy filled, and a man appointed, without any such interview being held or requested. The successful candidate proved to be a brother of a neighbouring engineer of considerable influence in the district. In the second case, canvassing was not forbidden. We will give the Committee credit so far. The undersigned, in this case also, was on the short list; being reserved for a cross-examination at the hands of a large number of gentlemen, many of whom knew as much of gas making (I mean coal gas, of course) as did their great-grandmothers. On the night previous to the interview, I was informed by an eminent gas engineer that it was very well known who was to have this appointment—mentioning the gentleman's name. Next day, I had the pleasure of meeting with the said young man, in company with other candidates, who, like myself, had been thus victimized. For my part, I had declined a meeting with another Board in order to be present at this interview. How many of the other candidates were so situated, I cannot say. Immediately on the party named entering the committee-room, we—the remaining candidates—knew at once the issue (by the general hilarity and "hail fellow well met" style of proceedings that instantaneously ensued), and that the information of the previous night was correct. Later on, the Secretary appeared, and gravely announced the decision of the Committee, arrived at "by untold trouble and discussion, due to the very general and earnest anxiety to rightly distinguish," &c., &c., and expressing sympathy with the disappointed candidates, and so on.

Still further, in connection with this same appointment. Before the date arranged for the interview, an acquaintance of mine received a letter from another party in the town making the appointment. The letter embodied four questions—given, I believe, in the order here below:—

(1) Do you know a person of the name of ———? (giving that of your correspondent).
(2) What are his politics?
(3) Is he a Churchman or a Nonconformist?
(4) Do you think he is a capable man?

Observe the position given to the matter of capability.

Lastly, the only other case I will now refer to is that of a smaller undertaking which also honoured me with an invitation to an interview. The terms even of the invitation were so dictatorial—abrupt almost to brutality, and parsimonious to a degree—that I declined the invitation with thanks. I afterwards learned that the Committee had appointed a gentleman whose exceptional abilities were to be handsomely recognized by the bestowal of a magnificent salary of considerably less than half they commanded at his previous engagement.

I trust that the importance to the profession of this unwarrantable intrusion into municipal gas appointments of any and every consideration other than professional ability and technical skill, may be accepted as an apology for troubling you at so much length.

AN INDIGNANT GAS MANAGER.

Aug. 3, 1895.

P.S.—On satisfactory guarantees being given through you, I should be prepared, if desired, to give "chapter and verse" for the foregoing statements.

Income-Tax and Depreciation.

"Inquirer" writes: "Would any reader of the JOURNAL kindly inform me as to the procedure generally adopted by gas companies for the adjustment of income-tax, and what allowances are made for depreciation of plant and machinery, after deducting general repairs, such as retorts, meters, pipes, &c.?"

LEGAL INTELLIGENCE.

HOUSE OF LORDS.—Monday, July 29.

(Before the LORD CHANCELLOR, LORD WATSON, LORD ASHBOURNE, *and* LORD MACNAGHTEN.)

The Mayor, &c., of the Borough of Bradford v. Pickles.

This was an appeal from an order of the Court of Appeal, reversing an order of Mr. Justice North's, and declaring that the appellants were not entitled to any of the relief claimed by them, and ordering them to pay the costs. The action was brought by the appellants to restrain the respondent from making or continuing a drift or tunnel in his lands situate near East Many Wells, in the parish of Bradford, Yorkshire, whereby the waters of certain springs and underground streams, known as Many Wells, to which the appellants alleged they were entitled under certain Acts of Parliament, might be diverted, drawn off, or diminished in quantity. The appellants were authorized by the Bradford Corporation Water-Works Act, 1854, to purchase the whole undertaking of the Bradford Water-Works Company, who had acquired the exclusive right to the springs and streams of water called Many Wells, arising or flowing in and through certain farm lands and grounds called Trooper or Many Wells Farm. By the 234th section of the Bradford Water-Works Act of 1842, it was provided that, after the Many Wells springs had been purchased by the Company, it should not be lawful for any persons to divert or appropriate in any other manner than by law they might be legally entitled, any of the waters then supplying or flowing from the same. The respondent was the owner of a farm of about 140 acres immediately adjoining Trooper's Farm, and on higher ground, which had been in the possession of his family for about 100 years. The surface soil was now let to certain agricultural tenants; but the mines and minerals, which are of considerable value, are reserved to the respondent. The respondent had been advised that large quantities of stone and other minerals could be profitably worked, if the works could be kept effectually drained and cleared of water without the expense of pumping-engines; but the effect would be that the underground stream of water which supplied Many Wells would be cut off. The appellants, by the present proceedings, sought to restrain the respondent from executing the proposed works for the purpose of draining his mines. The action was tried before Mr. Justice North in 1893, when the learned Judge granted an injunction restraining the respondent from executing his drainage works. The Court of Appeal, consisting of Lord Herschell (Lord Chancellor), Lord Justice Lindley, and Lord Justice A. L. Smith, reversed the decision of Mr. Justice North, and ordered the appellants to pay the costs.* The appellants now sought to have the decision of the Court of Appeal reversed.

Mr. COZENS-HARDY, Q.C., and Mr. B. EYRE appeared for the appellants; and Mr. EVERITT, Q.C., Mr. TINDAL ATKINSON, Q.C., and Mr. BUTCHER for the respondent.

The case was argued some time ago, when judgment was reserved.

Their LORDSHIPS delivered their considered judgment this morning, when they affirmed the decision of the Court of Appeal, and dismissed the action with costs.

The LORD CHANCELLOR: In this action, the plaintiffs seek to restrain the defendant from doing certain acts which they allege will interfere with the supply of water which they want, and which they are incorporated to collect for the purpose of better supplying the town of Bradford.

* Reports of the proceedings in the Lower Courts will be found in the JOURNAL, Vol. LXIII., p. 1018; Vol. LIV., pp. 931, 1215.

Mr. Justice North ordered the injunction to issue; but subsequently the Court of Appeal, consisting of Lord Herschell, Lord Justice Lindley, and Lord Justice Smith, reversed his judgment. The facts that are material to the decision of this question, seem to me to lie in a very narrow compass. The acts done, or sought to be done, by the defendant were all done upon his own land; and the interference, whatever it is, with the flow of water, is an interference with water which is under ground, and not shown to be water flowing in any defined stream, but is percolating water, which, but for such interference, would undoubtedly reach the plaintiffs' works, and in that sense does deprive them of the water which they would otherwise get. But although it does deprive them of water which they would otherwise get, it is necessary for the plaintiffs to establish that they have a right to the flow of water, and that the defendant has no right to do what he is doing. My Lords, I am of opinion that neither of those propositions can be established. Apart from the consideration of the particular Act of Parliament incorporating the plaintiffs, which requires separate treatment, the question whether the plaintiffs have a right to the flow of such water appears to me to be covered by authority. In the case of *Chasemore v. Richards* (7 H. L. Cases, 349), it became necessary for this House to decide whether an owner of land had a right to sink a well upon his own premises, and thereby abstract the subterranean water percolating through his own soil, which would otherwise, by the natural force of gravity, have found its way into springs which fed the River Wandle, the flow of which the plaintiff in that action had enjoyed for upwards of 60 years. The very question was then determined by this House; and it was held that the landowner had a right to do what he had done, whatever his object or purpose might be, and although the purpose might be wholly unconnected with the enjoyment of his own estate. It therefore appears to me that, treating this question apart from the particular Act of Parliament—and, indeed, apart from the 49th section of the Act of Parliament upon which the whole question turns—it would be absolutely hopeless to contend that this case is not governed by the authority of *Chasemore v. Richards*. This brings me to the 49th section of the Statute 17 and 18 Vict., c. 124, upon which reliance has been placed. That section is as follows: "It shall not be lawful for any person other than the Company to divert, alter, or appropriate in any other manner than by law they may be legally entitled, any of the waters supplying or flowing from certain streams and springs called Many Wells, arising or flowing in and through a certain farm called Trooper or Many Wells Farm, in the township of Wilsden, in the parish of Bradford, or to sink any well or pit, or do any act, matter, or thing whereby the waters of the said springs might be drawn off or diminished in quantity; and if any person shall illegally divert, alter, or appropriate the said water, or any part thereof, or sink any such well or pit, or shall do any other act, matter, or thing whereby the said waters may be drawn off or diminished in quantity, and shall not, immediately on being required so to do by the Company, repair the injury done by him, so as to restore the said springs and the waters thereof to the state in which they were before such illegal act as aforesaid, he shall forfeit to the Company any sum not exceeding £5 for every day during which the said supply of water shall be diverted or diminished by reason of any work done or act performed by, or by the authority of, such person, in addition to the damage the Company may sustain by reason of their supply of water being diminished." Whatever may be said of the drafting of this section, two things are clear—first, that the section in its terms contemplates that persons other than the Company may be legally entitled to divert, alter, or appropriate the waters supplying or flowing from the streams and springs: and, secondly, that the acts against which the section is directed must be illegal diversion, alteration, or appropriation of the said waters. The natural interpretation of such language seems to me to be this—that whereas the generality of the language of the section might apply to any alteration or appropriation of waters supplying or flowing from the streams and springs called Many Wells, the section only intended to protect such streams and springs and supplies as the Company should have acquired a right to by purchase, compensation, or otherwise; but in such wise as should vest in them the proprietorship of the waters, streams, springs, &c. And, lest the generality of the language should give them more than that to which they had acquired the proprietary right, the legal rights of all other persons were expressly saved; and upon this assumption, the latter part of the section makes penal the illegal diversion, alteration, or appropriation of any streams, &c., of which, by the hypothesis, the Company had become the proprietors. I do not think that Mr. Justice North does justice to the language of the section when he says that "the section enacts that a man is not to do certain specified things, except so far as he may lawfully do them." The fallacy of that particular observation (with all respect to Mr. Justice North) resides in the phrase "certain specified things." If my reading of the section be correct, the thing that is prohibited is taking or diverting water which has been appropriated and paid for by the Company; but the thing which is not prohibited is taking water which has not reached the Company's premises, to the property in which no title is given by the section, and which, by the very act complained of, never can reach the Company's premises at all. To use popular language, therefore, what is prohibited is taking what belongs to the Company; and what is not prohibited, is taking what does not belong to the Company. My Lords, I have used popular language, because I have no doubt that the draftsman who drew the section was encountered with the proposition in his own mind that you could not absolutely assert property in percolating water at all. You may have a right to the flow of water—you may have a property in the water when it is collected and appropriated, and reduced into possession; but in view of the particular subject-matter with which the draftsman was dealing, it seems to me intelligible enough why he adopted the phraseology now under construction. It appears to me that this is the true construction of the section from the language itself. But I confess I can entertain no doubt that the mere fact that the section, as construed by the plaintiffs, affords no right to compensation to those whose rights might be affected, is conclusive against the construction contended for by the plaintiffs. The only remaining point is the question of fact alleged by the plaintiffs—that the acts done by the defendant are done not with any view which deals with the use of his own land or the percolating water through it, but is done, in the language of the pleader, "maliciously." I am not certain that I can understand, or give any intelligible construction to the word so used. Upon the supposition on which I am now arguing, it comes to an allegation that the defendant did maliciously something that he had a right to do. If this question were to have been tried in old times as an injury to the right in an action on the case, the plaintiff would have had to allege, and to prove, if traversed, that he was entitled to the flow of the water, which, as I have already said, was an allegation he would have failed to establish. This is not a case in which the state of mind of the person doing the act can affect the right to do it. If it was a lawful act, however ill the motive might be, he had a right to do it; if it was an unlawful act, however good his motive might be, he would have no right to do it. Motives and intentions in such a question as is now before your Lordships seem to me to be absolutely irrelevant. But I am not prepared to adopt Lord Justice Lindley's view of the moral obliquity of the person insisting on his right when that right is challenged. It is not an uncommon thing to stop up a path which may be a convenience to everybody else, and the use of which may be no inconvenience to the owner of the land over which the path goes. But when the use of it is insisted upon as a right, it is a familiar mode of testing that right to stop the permissive use, which the owner of the land would contend it to be, though the use may form no inconvenience to the owner. So, here, if the owner of the adjoining land is in a situation in which an act of his, lawfully done on his own land, may divert the water which otherwise would go into the possession of this trading Company, I see no reason why he should not insist on their purchasing his interest, from which this trading Company desires to make profit. For these reasons, my Lords, I am of opinion that this appeal ought to be dismissed with costs, and that the plaintiffs should pay to the defendant the costs both here and below.

Lord WATSON, Lord ASHBOURNE, and Lord MACNAGHTEN concurred.

After some consultation between their Lordships, their Lordships resolved that the judgment of the Court of Appeal be affirmed, and that the action be dismissed with costs.

Electric Lighting Transformer Stations.

In the Chancery Division of the High Court of Justice on the 3rd inst., before Mr. Justice Stirling, the case of *The Wandsworth District Board of Works v. The County of London and Brush Provincial Electric Lighting Company, Limited*, was heard. The question was whether the defendants, who had been authorized by the Board of Trade, under a Provisional Order, to supply electricity in the plaintiffs' district, were at liberty to excavate and construct certain large chambers under the streets for the purpose of containing apparatus for transforming the electric current from high to low pressure. The question turned upon the construction of the Electric Lighting Acts and the Provisional Order for the district which had been confirmed by Parliament. The chambers proposed to be used by the defendants were 10 feet deep, 7ft. 6in. long, and 5ft. 6in. wide; and it was contended by the plaintiffs that they could not be considered "boxes" within the meaning of the Order, which allowed the use of street-boxes for certain purposes. His Lordship came to the conclusion that the question of the size of the boxes was one for the determination of the Board of Trade; and as that body had sanctioned the Company's plans, the plaintiffs were not entitled to prevent them from carrying them out. It was also contended that the boxes could not be used for the purpose of holding transformers; but the Provisional Order laid it down that they might be used (*inter alia*) for the purpose of regulating and controlling the supply of electrical energy. His Lordship thought that the process of transforming clearly came within these words. He accordingly refused to grant the injunction for which the plaintiffs asked.

Imitation of the "Torbay" Trade Mark.

At the Southwark Police Court last Wednesday, before Mr. Marsham, the Pomphlet Paint Company, of Southwark Street, S.E., appeared to an adjourned summons, taken out under the Merchandise Marks Act, 1887, by the Torbay Paint Company, of Billiter Street, E.C., and Torbay, South Devonshire, charging the defendant Company with having applied a false trade description to certain paints sold by them. Mr. H. Kisch, barrister (with whom was Mr. H. J. Turrell), prosecuted; Mr. G. M. Cohen, barrister, defended. The prosecution alleged that the defendants used a false trade description to the paints manufactured by them in such a way as to lead the public to believe that they were selling the goods manufactured by the complainants; also that they used words so nearly resembling the plaintiffs' trade mark as to lead the public to believe that it was the same. It was argued, on behalf of the complainants, that they were the original manufacturers of what was known as "Torbay" paint; and it was stated that the word "Torbay" became significant, because the paint was manufactured principally from a valuable deposit of iron oxide which came from certain beds on the coast of Torbay, and from nowhere else. The complainants owned all these beds; and the defendants had no interest whatever in them. Evidence on both sides having been given, the Magistrate said his view was that the word "Torbay" was really a place within the meaning of the Act, and must be so treated; and that the use of the word by the defendants was calculated to mislead the public. He therefore fined them £10, and 20 guineas costs.

Reading Corporation Water Department.—In a report submitted at the last meeting of the Reading Town Council, it was stated, respecting the expenses of special works caused by the frost, that the sum of £2590 of Corporation 3¼ per cent. stock, which formed part of the water-works depreciation fund, had been sold; and the amount realized, less charges, was £3230. The revenue accounts showed the balances of surplus profits to be £1201 for the half year ended Michaelmas, 1894, and £1151 for six months to Lady-day.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Half-Yearly Accounts.

In the JOURNAL last week we gave the report of the Directors of the above-named Company for the half year ending June 30 last, which will be presented to the shareholders at the general meeting to-morrow. The following is an epitome of the portions of the accounts in which but slight alterations have taken place; and the remainder will be found on the next page.

Statements Nos. 1 and 2 show the amount of share and loan capital raised at the close of the past half year. The former stood at £2,158,685; the latter, at £800,000—an increase of £18,685 of "C" stock, and of £25,000 of debenture stock, as compared with the preceding period.

Statements Nos. 3, 4, and 5—the capital, revenue, and profit and loss accounts—are given in full on the next page.

Statements Nos. 6, 7, and 8 show the positions of the reserve, renewal, and insurance funds. The reserve fund stood at £67,715, as compared with £61,071 on Dec. 31, 1894—the difference consisting of interest on the amount invested, £794; and undivided dividend transferred from the net revenue account, £5850. The renewal fund stood at £14,022; and the insurance fund, at £42,184. At the close of 1894, the last-named fund stood at £36,507. The difference consists of £280 received for interest, and £5397 brought from the net revenue account.

Statements Nos. 9 to 11—furnishing particulars as to the manufacturing operations of the Company—and No. 12, the general balance-sheet, are given in full.

BROMLEY GAS CONSUMERS' COMPANY.

Half-Yearly Report and Accounts.

The trading of this Company during the past half year, as shown by the Directors' report and accounts, has been of a gratifying nature. The quantity of gas made advanced to the total of 102 million cubic feet; being nearly 12 millions in excess of the corresponding half of last year, or an increase of 13·3 per cent., as compared with the then corresponding increase of about 4·6 per cent. The profit and loss account shows a balance of £6263; and the Directors recommend the declaration of the usual dividend at the rates of 11½ per cent. per annum on the ordinary 10 per cent. shares, and 8¼ per cent. on the 7 per cent. shares, which will absorb £5723, and leave a balance of £540 to be carried forward. The Directors mention in their report that oil-gas plant has been successfully completed and brought into use, with satisfactory results; the experience gained suggesting certain additions and substitutions which are now being effected in readiness for the coming season. The maximum day's demand for gas last winter having exceeded the maximum manufacturing power of the works on their old scale, the policy of the Board in making the recent enlargement and improvement of the plant has been fully justified. For greater facility, regularity, and economy in stoking, it has been decided to adopt hydraulic machinery in the new retort-house; the works preparatory to its reception being nearly finished. A mechanical coke-breaker is also in course of erection. As nearly the whole of the capital last created by the Company, and authorized to be issued, has now been raised, a resolution for the creation of further share capital, to the extent of 1000 £10 shares of the ordinary 7 per cent. capital under the Company's Act of 1879, and of the further sum of debenture stock capable of being raised in relation thereto, and empowering the Directors to issue the same from time to time, will be submitted for adoption at the coming meeting of the shareholders. The Directors also record with regret the very sudden death of the late esteemed Chairman of the Company, Mr. Robinson Latter, whose valuable services from the formation of the concern largely contributed to its prosperity. The Directors have elected Mr. A. Dickson as Chairman of the Board, and Mr. A. E. Willett as a Director.

Concerning the accounts, the total revenue of the half year was £20,028, which was derived from the following sources: Gas, £14,872; meter-rental, £379; residuals, £4551; rents, £32; fitting, £93; rental of fittings and stoves, £97; and transfer fees, £2. The sum expended on revenue account was £13,722, which was made up as follows: Manufacture of gas, £11,056; distribution, £243; public lamps, £252; rates and taxes, £726; management, £1388; bad debts and allowances, £23; and other small items amount to about £34. The balance carried to profit and loss account is £6306. The quantity of coal carbonized during the half year (including 148 tons of cannel) was 10,786 tons, from which 102,179,000 cubic feet of gas were made, and the following quantities of residuals produced: Coke, 10,786 chaldrons; breeze, 1417 chaldrons; tar, 99,799 gallons; and sulphate of ammonia, 69 tons. With reference to the capital account, the sum spent in the six months was £3214; making the total £169,201. As the total capital receipts to June 30 amounted to £168,049, the balance overdrawn is £1152.

SOUTHPORT CORPORATION GAS DEPARTMENT.

Annual Report of the Gas Engineer.

The Engineer and Manager of the Southport Corporation Gas Department (Mr. J. Booth), in submitting to his Committee his report upon the working of the gas undertaking during the year ending March 25 last, remarks that it is satisfactory to say there has been a large increase in the sale of gas; and, in the matter of net profit realized, the year is a record one. There are, he observes, several causes for the year being so successful, among which may be stated—(1) The substitution of oil for cannel as an enricher; (2) the increase in the price of gas; (3) cheaper coal; and (4) less expenditure for renewals. The installation of the small oil-gas plant in the early part of 1894 has been a great financial success. To show the monetary saving by using oil in place of cannel, Mr. Booth gives the total cost of the enrichers used in the years ending in 1893 and 1895; leaving out 1894, when, owing to the coal strike, enhanced prices were paid for cannel. In 1892-3, £11,472 was paid for cannel; and in 1894-5, £951 was spent on cannel, and £1498 on oil—the enriching material thus costing for the past year £9023 less than in 1892-3. The increase in the price of gas of 3d. and 6d. per 1000 cubic feet in Southport and Birkdale respectively, has been maintained throughout the year; but in September, 1894, it was agreed that for gas consumed by separate meter, for all purposes other than lighting, the charge should be 6d. per 1000 cubic feet less than the current price. It is interesting to note that, at the end of the year, there were in use 189 meters for cooking and heating purposes, and 71 meters connected to gas-engines. The cost of coal during the twelvemonth averaged about 4d. per ton less than in the previous year; being equal to £608. In the carbonizing department, the total quantity of gas made amounted to 350,850,000 cubic feet; being an increase of 36,110,000 cubic feet, or 11·47 per cent. The materials used varied as follows: Oil increased by 428 tons; cannel decreased by 12,842 tons; and coal increased by 16,210 tons. These figures in another way prove the benefit obtained from the introduction of the manufacture of oil gas. The minimum and maximum makes of gas during 24 hours were 417,000 cubic feet and 1,604,000 cubic feet respectively; and on 165 days the make of gas exceeded a million cubic feet. The total number of retorts now available is: Throughs, 198; singles, 36; and oil, 18. The quantity of gas sold amounted to 334,626,800 cubic feet; being an increase over the previous year of 34,351,800 cubic feet, or 11·44 per cent. The minimum and maximum deliveries of gas were 361,000 cubic feet and 1,776,000 cubic feet respectively; and on 169 days, the delivery of gas from the works exceeded a million cubic feet. During the year, 375 new service-pipes were laid, and 507 new meters fixed; the total number of the latter at the close being 9406. The sales of residuals realized £13,804; the net increase being £1126. There was an increase on coke of £1584, and on tar of £125; but sulphate of ammonia produced £583 less—the average price being about £1 per ton lower than in the previous year. The total amount received for residuals equalled 7s. 2·84d. per ton of coal carbonized. The gross profit for the year is £23,118; and after paying interest on loans £5270, and sinking fund £1591, there remains a net profit of £16,256. Of this amount, £200 is placed to the reserve fund; leaving available for the relief of the rates or other purposes £16,056, which is equal to a rate of about 14·25d. in the pound. The gas-works reserve fund now amounts to £1458. The expenditure during the year on capital account was only £1095; the total of this account at the end of the year being £188,052. The total sum paid off capital account through the sinking fund is £37,495; and the present mortgage debt amounts to £150,735. Regarding the works, new purifiers were put to work in July, 1894; the sulphate of ammonia house has been taken down and re-built during the year; and in connection with the sulphate plant a new saturator is being fixed. With a view of increasing the sale of gas in the daytime, it was agreed in September last to let out gas-cookers, &c., on hire; but the Corporation not having powers to do this, application was made to the Local Government Board for a Provisional Order giving them the necessary authority, and the usual inquiry was held. The Board have intimated their consent to the application; and the Order is now waiting parliamentary sanction. The new work in hand for the current year includes the following: Buildings and plant for carburetted water gas equal to a make of 750,000 cubic feet of gas per day; erection of condensers for 1¼ million cubic feet of gas per day; a tank for storing tar; and the fixing of two additional exhausters.

THE PROFITS OF THE LEEDS CORPORATION GAS-WORKS.

On the Chairman of the Gas Committee (Mr. Tweedale) presenting their report at last Wednesday's meeting of the Leeds City Council, Mr. Willey called attention to the great profit that had been made in the year ending March last. There was a surplus on the trading of £33,718. At the commencement of the year, there was an accumulated deficiency amounting to £31,188; so that at the end there was a net surplus on the revenue account of £2530. Mr. Batley remarked that the Council ought not to forget that much of this satisfactory result was due to the lower price of coal. Mr. Lowden hoped that, at the next meeting of the Council, the Chairman of the Gas Committee would be prepared to propose a reduction in the price of gas. As to the quality, he did not think that any change was necessary. The illuminating power had, he thought, been quite satisfactory. Mr. Wilson asked the Chairman of the Committee, when considering the question of the disposal of the surplus, to remember the Lamp Committee. The Mayor (Alderman Gilston) said that, with regard to the surplus up to Jan. 25, it was made upon contracts entered into in June of 1894. At that time he predicted that, by the end of June of this year, they would clear off the entire deficit. The present Committee had done well; but he was satisfied that they did not wish to take any credit to the disadvantage of their predecessors. Mr. Tweedale thought the discussion which had taken place was rather inopportune. The questions of the reduction of the price of gas, the abolition of gas-meter rents, and the abolition of the lamp-rate, were not before the Council; and he thought it would have been advisable if the matters had been first discussed by the Committee. In reply to Mr. Henry, Mr. Tweedale added that the opinions he held prior to his appointment as Chairman of the Committee as to the quality of the Leeds gas had not changed. He held the same views as to the management of the gas-works and as to the quality of the gas. The report was adopted.

Sulphate Plant for the Stalybridge Gas-Works.—The Gas Committee of the Stalybridge Corporation have resolved to recommend the Council to give an order for the erection of a sulphate of ammonia plant, at a cost of about £725.

ACCOUNTS OF THE SOUTH METROPOLITAN GAS COMPANY FOR THE HALF YEAR ENDED JUNE 30, 1895.

No. 3.—CAPITAL ACCOUNT.

Dr.

	£ s. d.	£ s. d.
To Expenditure to Dec. 31, 1894	..	3,269,364 10 8
Expenditure during half year to June 30, 1895, viz.—		
New buildings and machinery in extension of works	4,396 14 2	
New and additional mains and services	8,064 19 5	
Do. meters	11,867 1 4	
Do. stoves	14,385 4 10	
	38,713 19 9	
Cr. By sale of land	4,3 0 0 0	34,333 19 9
Total expenditure	..	3,303,728 10 5
Balance	..	185,032 17 7
		3,489,761 8 0

Cr.

Description of Capital.	Certified to Dec. 31, 1894.	Received since that Date.	Total to June 30, 1895.
	£ s. d.		£ s. d.
By A stock	500,000 0 0	..	500,000 0 0
B stock	1,350,000 0 0	..	1,350,000 0 0
C stock	290,000 0 0	18,685 0 0	308,685 0 0
Debenture stock, 5 per cent.	775,000 0 0	25,000 0 0	800,000 0 0
	2,915,000 0 0	43,685 0 0	2,958,685 0 0
Premium capital	474,899 0 0	56,177 8 0	531,076 8 0
	3,389,899 0 0	99,862 8 0	
			3,489,761 8 0

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—				By Sale of gas—			
Coals into store, including cost of petroleum spirit for enriching (See Account No. 9)	£223,528 5 5			Lady Day, at 2s. 4d. per 1000 feet	£276,637 12 6		
Purification, including £3714 12s. for labour	10,440 5 10			Midsummer, at 2s. 4d. per 1000 feet	150,411 8 4		
Salaries of Engineer and Officers at works	6,230 10 10				£427,049 0 10		
Wages (carbonizing)	49,457 0 3			Public lighting and under contracts (see Statement No. 11)	30,787 13 10		
Repairs and maintenance of works and plant, including £36,216 4s. 2d. for labour, less £1421 3s. 0d. received for old materials	73,843 14 0					£457,836 14	
		£339,479 16 4		Meters in use, 119,242—			
Profit sharing for 12 months to June 30, 1895	£13,538 11 7			Company's meters at rent: Ordinary, 77,885; automatic, 32,333	£11,397 9 1		
Less on account, Dec. 31, 1894	6,000 0 0			Stoves at rent: Ordinary, 27,120; auto., 20,817	7,718 3 2		
		7,538 11 7				19,115 12 3	
Distribution of gas—				Residual products—			
Repair, maintenance, and renewal of mains and service pipes, including £12,289 16s. 6d. for labour	£16,644 13 4			Coke, less £15,071 16s. 5d. for labour, &c.	£110,479 1 2		
Salaries, &c., Officers and Rental Clerks	10,595 8 2			Breeze, less £2159 1s. 4d. for labour, &c.	3,287 11 10		
Repair, &c., of meters (£920 16s. 11d. for labour)	2,341 5 5			Tar, less £356 14s. 10d. for labour, &c.	25,476 7 9		
Repair, &c., of stoves (£2127 3s. 9d. for labour)	5,884 3 0			Ammoniacal liquor, less £184 12s. 3d. for labour, &c.	14,983 3 4		
Gas fittings (labour)	3,499 4 9			Sulphate, less £4026 10s. 6d. labour, acid, &c.	12,970 11 4		
		45,875 14 8				167,196 15 5	
Public lamps—lighting and repairing		6,234 10 3		Rents receivable		1,537 16 0	
Rents, rates, and taxes		23,478 13 8		Transfer fees		72 2 6	
Management—							
Directors' allowance	£1,750 0 0						
Salaries of Secretary, Accountant, and Clerks	2,166 16 1						
Collectors	6,749 10 10						
Stationery and printing	1,368 12 7						
General charges	3,860 6 3						
Company's Auditors	112 10 0						
		16,007 15 9					
Parliamentary charges		542 1 6					
Bad debts		1,392 13 1					
Pensions and officers and men's superannuation and sick fund		3,915 16 7					
Gas Referees and Official Auditor		291 2 1					
Total expenditure		£468,756 15 6					
Balance carried to net revenue account (No. 5)		177,002 5 4					
		£645,759 0 10		Total receipts		£645,759 0 10	

No. 5.—PROFIT AND LOSS (NET REVENUE) ACCOUNT.

Interest on temporary loan and deposits	£1,177 14 3	Balance from last account	£172,736 14 7
Interest on debenture stock	19,333 6 8	*Less*—Dividend for half year ended Dec. 31, 1894	£133,600 0 0
Amount carried to insurance fund	5,396 1 3	Dividend undivided carried to reserve fund	5,850 0 0
Balance applicable to dividend on the ordinary stock	179,577 17 11		144,450 0 0
			£28,286 14 7
		Amount from revenue account (No. 4)	177,002 5 4
		Interest on Bankers' balances	196 13 2
	£205,485 13 1		£205,485 13 1

No. 9.—STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1894.	Received during the Half Year.	Carbonized during the Half Year.	Used during the Half Year.	In Store, June 30, 1895.
	Tons.	Tons.	Tons.	Tons.	Tons.
Newcastle coal	72,488	352,836	407,129	405	17,790
Cannel coal	1,592	1,130	1,352*	..	1,370
	74,080	353,966	408,481	405	19,160

* 245,334 gallons of petroleum spirit used as a substitute for cannel.

No. 10.—STATEMENT OF RESIDUAL PRODUCTS.

—	In Store, Dec. 31, 1894.	Made during Half Year.	Used in the Half Year.	Sold in the Half Year.	In Store, June 30, 1895.
Coke—cwt.†	478,553	5,024,748	1,002,815	3,789,011	711,475
Breeze—yards	6,292	76,050	16,064	60,488	5,790
Tar—gallons	357,655	4,054,249	11,165	4,141,017	269,722
Ammoniacal liquor—butts	17,372	136,456	59,173	74,906	9,749

† 1 cwt. of coke about equals 1 sack of 4 bushels, under Weights and Measures Act, 1878.

No. 11.—STATEMENT OF GAS MADE, SOLD, ETC.

Description of Gas.	Quantity made.	Quantity Sold.			Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
		Public Lights (estimated).	Private Lights (per Meter).	Total Quantity Sold.				
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	4,179,426	220,072	3,695,340	3,915,412	56,553	3,971,965	207,461	19,680

No. 12.—BALANCE-SHEET.

To Capital—		By Cash at Bankers	£204,641 19 7
Balance—per account No. 3	£185,032 17 7	Amount invested (reserve fund, £54,636 11s. 3d.; renewal fund, £14,012 10s. 3d.; insurance fund, £20,098 6s. 11d.)	88,747 8 10
Reserve fund—per account No. 6	67,715 0 1	Cash in hand for sundry payments	500 0 0
Renewal fund—per account No. 7	14,022 4 5	Stores in hand—	
Insurance fund—per account No. 8	42,184 2 8	Coals and enriching materials	£11,472 4 3
Net revenue account—for balance, per account No. 5	179,577 17 11	Coke and breeze	15,111 17 11
Debenture interest, for amount due to June 30, 1895	19,333 6 8	Tar, sulphate, and ammoniacal liquor	4,613 9 5
Sundry tradesmen, for amount due for coals, stores, and sundries	52,983 0 4	Sundry stores	105,640 14 10
Deposits by consumers	25,969 18 5		136,838 6 5
Dividend account (outstanding)	1,487 13 11	Investment of workmen's bonus, &c.	11,167 12 9
Debenture account ,,	368 18 1	Accounts due to the Company—	
Workmen's bonus and savings deposited with the Company	41,212 3 0	Gas meter and stove rental, quarter ending June 30, 1895	£159,098 1 11
Officers' superannuation and guarantee funds	21,669 6 3	Arrears outstanding	3,875 19 1
			162,974 1 0
		Coke and other residual products	18,401 4 6
		Balance due for automatic gas-fittings	25,680 9 0
		Sundries	3,605 16 3
	£652,556 9 4		£652,556 9 4

THE BOLTON CORPORATION AND THEIR GAS STOKERS.

A threatened strike of stokers at the Lum Street Gas-Works of the Bolton Corporation has been averted for the present; but a good deal of friction has been created between the parties to the dispute. Alderman Miles, the Chairman of the Gas Committee, explained to the Council, at their meeting last Wednesday, how matters stood in regard to the dispute. He said that early in the present year the stokers, under the auspices of the Gas-Workers' Union, made an application for an alteration of the conditions under which they laboured, and also for increased remuneration. After long negotiations, it was agreed that the stokers should be paid time-and-a-half for a third shift of eight hours on Sundays. Formerly only two shifts were paid time-and-a-half; and the Committee agreed to the extra remuneration for the other shift, provided the men could see their way to carbonize a little extra coal. At the Lum Street works, the coal then carbonized was 3 tons 8 cwt.; and it was felt, in view of the concession, that 3 tons 12 cwt. would be a reasonable quantity. Since the generative system of firing had been adopted at Lum Street, it had been found that, with 3 tons 8 cwt., the 560 odd retorts had never done a full day's work; and the Engineer had from the outset advocated a much larger quantity being carbonized. The men provisionally agreed to the extra work, providing screens were put up; and the new arrangement was to take effect as from the 1st inst. Before a shift and a half had been completed on that day, however, the men declared they could not do the work, and were disinclined to continue the attempt. The Committee offered, as a means of settlement, that from the 1st of October to the 31st of March, 3 tons 12 cwt. of coal should be carbonized each shift, and for the remainder of the year 3 tons 8 cwt.; but this proposition was rejected by the men. At a special meeting of the Committee held the night previous to the Council meeting, it was resolved that the increased carbonization of coal be not insisted upon, provided the money paid to the workmen since the 5th of April, in pursuance of the original arrangement, be refunded, and that in future time-and-a-half only be paid for the two shifts on Sundays. Alderman Miles added that he presumed this would settle the matter; but he could not refrain from expressing the opinion that the action of the men was misguided. He would leave the future to develop itself. The proceedings of the Committee were confirmed without comment. The men at the Gas Street works of the Corporation are not affected by the dispute.

MANCHESTER CORPORATION GAS AND ELECTRIC LIGHT SUPPLY.

Annual Reports of the Gas and Electric Light Committee—Abstract of the Accounts of the Gas Department.

In the last number of the JOURNAL, we referred to the result of the working of the Manchester Corporation Gas Department in the past financial year. The department, it will be remembered, has also the management of the electric light undertaking. We have, as usual, received from the Superintendent (Mr. Charles Nickson) copies of the annual reports of the Gas and Electric Lighting Committee, from which we make the following extracts:—

The Gas Committee begin by calling attention to the fact that the long-continued frost of last winter and the exceptionally dark and severe weather during the months of February and March last caused a great increase in the consumption of gas, especially during the daytime, which taxed to the utmost the resources of the works. The Committee, however, were enabled to give a full supply of gas during the whole year. The increase for the twelve months was 4·28 per cent., as compared with a decrease of 2·82 per cent. in the year 1893-4. The following statement shows the quantity of coal and cannel carbonized during the past year as compared with the previous year:—

	Coal and Cannel Carbonized. Tons.	Gas Made per Ton. Cubic Feet.	Gas Sent Out from the Works. Cubic Feet.	Gas Unaccounted for. Cubic Feet.	Per-centage of Loss.
1895 . .	364,895	10,084	3,683,067,000	103,634,000	2·81
1894 . .	360,654	9,802	3,532,035,000	112,910,000	3·20

The average illuminating power of the gas sent out was equivalent to 19·16 sperm candles, as against 19·04 candles for the previous year. The following statement shows the quantity of coke, tar, and ammoniacal liquor made during the year, as compared with the year 1893-4:—

	Tar.		Ammoniacal Liquor.		Coke.	
	Total Quantity. Tons.	Yield per Ton. Gallons.	Total Quantity 10-oz. Strength. Gallons.	Yield per Ton. Gallons.	Total Quantity. Tons.	Yield per Ton. Cwt.
1895 . .	25,110	13·42	10,177,248	27·90	231,125	12·67
1894 . .	21,990	11·90	9,142,616	25·35	235,474	13·06

The number of consumers in the city in the past financial year was 66,345; and beyond the city, 15,944—making a total of 82,289, or 652 more than in the previous year. The average consumption of gas per consumer in the city was 42,208 cubic feet; and beyond the city, 27,743 cubic feet. The number of gas fires and cookers in use was 7040, and the number of gas-engines 983, as compared with 6160 and 858 respectively for the year ended March 31, 1894. The quantity of gas used in these appliances is estimated at 185,500,000 cubic feet; being an increase of 14·51 per cent. The number of prepayment meters in use at the end of the financial year was 1481; being an increase of 956. The quantity of gas consumed through these meters was 6,480,000 cubic feet—an increase of 4,088,100 cubic feet, or 170·87 per cent., on the preceding year.

The total amount of revenue last year was £579,277 14s. 9d., as compared with £569,031 14s. 5d. in the year 1893-4; being an increase of £10,246 0s. 4d. The amounts received were as follows:—

	Year 1894-5.	Year 1893-4.
Gas-rents within the city . . .	£361,467	£348,695
,, beyond the city . . .	74,693	70,927
City fund for street lighting . .	46,058	44,878
Coke	46,077	53,211
Tar	18,905	18,270
Ammonia water	31,705	32,774
Sundry receipts	373	277
Total	£579,278	£569,032

With regard to expenditure, the amount paid for coal and cannel, including the cost of unloading, was £244,011 13s. 6d., against £293,280 10s. for 1893-4; being a decrease of £49,268 16s. 6d. The gross profit on the year's working is £134,692 1s. 6d. The sum of £30,299 13s. 8d. was paid for interest, and £13,954 has been placed to the sinking fund (as required by the Acts of Parliament under which the money is borrowed). The net profit therefore amounted to £90,438 7s. 10d., which has been applied as follows: Amount paid over to the city fund during the year, as per estimate, £54,044; balance placed to the contingent fund account (of which sum £15,000 will be paid to the city fund in aid of the rates for the year ending March 31, 1896), £36,394 7s. 10d.

By the decision of the City Council on Feb. 6 last, meter-rents were abolished within the city, and the price of gas was reduced 3d. per 1000 cubic feet to all consumers both within and beyond the city. These concessions it is estimated will reduce the revenue of the department from meter-rents, by £10,500; from gas-rents within the city, by £39,500; and from gas-rents beyond the city, by £6100—together £56,100. The advantageous terms upon which coal and cannel have been recently purchased will, however, to some extent compensate the Committee for these reductions.

As to extensions and renewal of works, the Committee state that the new gasholder at the Gaythorn station was in partial use during the past winter, and will be fully available for next winter, to ensure a good supply of gas to rapidly-increasing districts to the south and south-west of the city. The four large purifiers, and the new condenser, Livesey washer, and washer-scrubbers, reported last year to be in progress at the Rochdale Road station, have been completed, and have worked satisfactorily. The construction of the tank for the large gasholder at the Bradford Road station has made fair progress, and is now rapidly approaching completion. A new stage-floor has been erected in No. 2 retort-house. The new offices, stables, stores, and mechanics' workshops have been completed, and are now in occupation and use, and are adding greatly to convenience and efficiency in working the station. The settings of inclined retorts at the Droylsden station continue to give satisfaction. An experiment in the purification of gas which is being tried there is being watched with considerable interest, with the view of ascertaining if the result will justify its application to other of the works. The usual annual renewals and repairs of plant have been efficiently carried out; and the whole of the works have been kept in thorough order out of revenue.

With respect to the supply and distribution of gas, the operations of the past year were chiefly devoted to a thorough examination and repair of the mains and services, the whole of which, so far as is known, are in good condition. This is clearly proved by the loss from leakage and condensation being only 2·81 per cent.—the lowest on record. The work of laying larger mains along some of the principal roads leading to certain outlying districts is to be completed during the present summer.

The new building erected in Deansgate for the exhibition of gas-stoves is now complete; and various cookers, fires, and other gas-consuming appliances are being fixed therein. The basement is used as a workshop; and the top storey for light repairs. The whole of the building is lighted by gas and electricity; and a small electric motor has been put up to supply power to certain machines. The premises are well adapted to the purpose for which they are intended; and the Committee are about to take steps to promote gas consumption for cooking, heating, power, and other non-illuminating purposes.

In the report on the electric light undertaking, the Committee state that the number of consumers at the close of the year ending March 31 last was 741; being an increase of 329 as compared with the previous year. The number of lamps in use was: Incandescent, 30,316 (of 16-candle power); and arc, 385. For the preceding year, the numbers were 18,478 and 250 respectively. There were also 17 motors in use, representing 16-horse power, as compared with 11 similar motors last year. The total length of mains laid was 63 miles 258 yards. The total quantity of current accounted for was 1,199,988 units. The amount received for sales of current, which works out to 5·63d. per unit accounted for, was £28,145 3s. 6d.; the rental of meters was £494 19s. 11d.—making a total revenue of £28,640 3s. 5d. The cost of generation, distribution, and management was £10,991 17s. 4d.; to which must be added £7938 18s. 7d. for interest, bankers' commission, and sinking fund, and £4000 for transfer to renewals account—total, £22,930 15s. 11d. This left a balance of £5709 7s. 6d., which has been dealt with as follows: To previous year's debit balance, £209 18s. 10d.; carried forward to next year's account, £5499 8s. 8d. (of which sum it has been decided to pay £5140 12s. 11d. to the city fund in aid of rates for the year ending March, 1896, as per estimates). The reduction in the price of current from 8d. to 6d. per unit is estimated to affect the revenue during the current year to the amount of £4650; but it is expected that increased business will to some extent recoup the Committee for this reduction. The works reported last year to be in progress, with the new offices, workshops, and store-rooms, have been completed, and are now in full use and occupancy. The entire plant has worked satisfactorily; and there has been no interruption in the supply of current of more than a minute or so, and then only on a portion of the system, throughout the year. The applications for the supply of electricity have been so numerous that, as already reported to the Council, the Committee have decided to increase the plant at the central station; to erect a storage battery equal to 4000 16-candle power incandescent lamps at the Hunt's Bank sub-station, and to extend the supply of electricity in various streets. The Local Government Board have given authority to the Corporation to borrow the sum of £100,000 for

carrying out these extensions and additions to the plant, which are expected to be partly available for the ensuing winter. The plans are in a forward state; and main laying has already been commenced. The method of distribution will be as before—on the five-wire system; and it is intended to carry out the extensions of mains by the Corporation's own staff.

The following are some of the principal figures in the accounts of the Gas Department for the year ending March 31 last;—

PROFIT AND LOSS ACCOUNT

EXPENDITURE.

Cannel and coal (including cost of unloading, &c.)		£244,011 13 6
Retort men's wages		43,585 8 11
Retorts, fire-bricks, &c. (including cost of setting)		11,199 15 5
Repairs and maintenance of works, mains, &c.		52,729 10 4
Purifying material and wages		4,020 17 0
Salaries and wages of clerks in Superintendent's office, rental and inquiry offices, and meter inspectors		16,964 6 8
Collectors' salaries		7,212 11 1
Rents, rates, and taxes		22,404 11 1
Renewals of plant, &c.		24,689 16 4
Bad debts		592 19 4
Miscellaneous expenses		4,872 5 8
Lighting, repairing, and maintaining city lamps		12,296 16 8
		£444,580 12 0
Balance carried forward		134,697 2 9
		£579,277 14 9
Interest		£30,304 14 11
Sinking fund		13,954 0 0
Balance carried down		90,438 7 10
		£134,697 2 9

INCOME.

Gas-rental		£416,409 19 10
Meter-rents		13,110 6 9
Stove-hire		1,578 17 1
Total cost of street lighting receivable from city fund—		
Value of gas	£33,760 18 1	
Lighting, repairs, and maintenance	12,296 16 8	
		46,057 14 9
Public lamps beyond the city		5,060 6 9
Residual products—		
Coke	£46,077 4 10	
Tar	18,905 3 10	
Ammonia water	31,704 16 5	
		96,687 5 1
Rents of cottages, &c.		373 4 6
		£579,277 14 9
Balance of profit		£90,438 7 10
Amount paid over to the city fund account		£54,044 0 0
Balance placed to contingent fund account		36,394 7 10
		£90,438 7 10

STATEMENT OF ASSETS AND LIABILITIES.

ASSETS.

Gaythorn station—land, buildings, and apparatus		£238,357 3 2
Rochdale Road station		284,645 10 10
Bradford Road station		509,496 6 5
Droylsden station		25,404 16 10
Street-mains stores (Poland Street)—land, buildings, and apparatus		2,961 8 10
Street-mains		397,968 9 0
Service-pipes		63,942 12 8
Hired meters		88,432 17 1
Hired stoves		11,923 11 10
Stoves show-rooms (Deansgate)		6,132 2 11
Cottage property purchase-money		1,652 13 6
Total property		£1,630,917 13 1
Cannel, coal, retorts, and other material in stock		117,106 7 2
Gas-rents and other accounts due to the Committee		160,633 14 2
Cash in hand		5,673 13 1
Total property and assets		£1,914,331 7 6

LIABILITIES.

Mortgage debt		£828,627 0 0
Sums advanced (not secured by mortgage)		1,430 0 0
City fund—		
Amount received for street lighting	£47,316 4 0	
Less expenditure (including balance brought forward)	46,886 16 6	
		429 7 6
Accounts owing for coal, &c.		41,665 9 4
Deposits held in security of gas-rents		38,788 3 4
Interest due thereon		5,384 4 4
Cash deposits for due performance of contracts		4,550 0 0
Amount payable on account of cottage property		1,600 0 0
Amount owing to bankers		63,379 9 11
Total liabilities		£985,853 14 5
Surplus and sinking fund, as per last statement	£872,248 10 0	
Transferred from profit and loss account for the year ended March 31, 1895	13,954 0 0	
		886,202 10 0
Contingent fund account—		
Amount as on March 31, 1894	£5,880 15 3	
Add transferred from the profit and loss account this year	36,394 7 10	
		42,275 3 1
		£1,914,331 7 6

GENERAL SUMMARY OF THE CAPITAL AND REVENUE ACCOUNTS.

RECEIPTS.

Balance brought forward (see summary March 31, 1894)		£150,897 6 5
Amount received on sale of clay, &c., at Bradford Road		50 0 0
Loans received during the year		194,551 0 0
Sinking fund, transferred from profit and loss account		13,954 0 0
Balance of profit and loss account (as per statement)		90,438 7 10
		£449,890 14 3

EXPENDITURE.

Loans repaid		£19,900 0 0
Temporary loan from Manchester Ship Canal Company		175,000 0 0
Amount paid over to the city fund account, being the estimated year's profits		54,044 0 0
Expenditure charged to capital account		73,329 14 3
Stocks on hand	£117,106 7 2	
Gas-rents, &c. due	160,633 14 2	
Cash in hand	5,673 13 1	
	£283,413 14 5	
Less accounts owing to sundry creditors	155,796 14 5	
		127,617 0 0
		£449,890 14 3

The accounts proper are followed by the usual appendices, giving some interesting statistics as to the progress of the gas undertaking during the past municipal year.

The figures in Appendix A—a statement of the lamp and private rental, including meter and stove rents, derived from within and beyond the city—have already been given when dealing with the profit and loss account.

Appendix B is a comparative statement of the gas transmitted from the works in the daytime and during the twenty-four hours, for the past two years. Summarized, the figures are as follows:—

	Daytime. Cubic Feet.	Twenty-four Hours. Cubic Feet.
Year ended March 31, 1894	865,994,000	3,532,035,000
Do. do. 1895	988,362,000	3,683,067,000
Increase	122,368,000	151,032,000

	Cubic Feet.
Quantity of gas transmitted from works	3,683,067,000
,, measured and accounted for	3,579,433,000
Loss (by condensation and leakage)	103,634,000, or 2·81 per cent.

In Appendix C, particulars are given as to the results of the working from June 24, 1880, to March 31, 1895. The table contains statistics as to the number of tons of coal carbonized, the total make of gas, the percentage unaccounted for, the yield per ton of coal, the illuminating power of the gas, the quantity of residual products, &c., for each year in the above-mentioned period. The particulars for the past financial year are as follows: Coal and cannel carbonized, 364,895 tons; gas made, 3,679,669,000 cubic feet; yield per ton of coal carbonized, 10,084 cubic feet; illuminating power, 19·16 candles; make, reduced to 20-candle power, 3,525,122,000 cubic feet; make per ton, 20-candle power, 9661 cubic feet; make of coke, 231,125 tons; do. per ton of coal, 12·67 cwt.; make of tar, 25,110 tons; do. per ton of coal, 13·42 gallons; make of ammoniacal liquor (10-oz. strength), 10,177,248 gallons; do. per ton of coal, 27·9 gallons.

Appendix D shows the number of stoves and of each size of meter in use during the year in the city and out-townships. At the close of the past financial year, there were 5300 stoves in use within, and 1740 beyond the city—together, 7040. Of these, 2544 were on hire within, and 835 beyond the city (together, 3379), as compared with 2343 and 776 (together, 3119) at the corresponding date in 1894; so that there was an increase of 260. The numbers of the meters in use were 82,289 in 1895 and 81,637 in 1894. There was last year a net increase of 652 on the number for the preceding year. Of the total number at work on March 31 last, 72,881 were on hire, as compared with 71,796 at the close of the financial year 1893-4. The number of prepayment meters on hire on March 31 last was 1481—an increase of 956 on the number at the close of the preceding year.

From Appendix E we learn that the gas-mains laid last year within the city amounted to 19,128 yards, and beyond the city to 7809 yards—a total of 26,937 yards, or 15¼ miles 97 yards. The mains taken up were 9209 and 992 yards respectively—a total of 10,201 yards, or 5¾ miles 81 yards. The total net increase during the year therefore was 16,736 yards, or 9½ miles 16 yards. The total length of mains laid at March 31 last was 1,274,254 yards, or 724 miles 14 yards.

Appendix F consists of a statement showing the amount of gross profit made from the gas undertaking, and the mode of its appropriation, also the amount of borrowed money owing, excess of assets, &c., from 1862 to March last. The figures for the past financial year are as follows: Profit, £134,697; paid over for improvement purposes, £54,044; carried to contingent fund, £36,394; borrowed money owing, £830,057; and excess of assets, £928,477. The profit of £134,697 is appropriated thus: Interest, £30,304; liquidation of mortgage debt, £13,954—leaving a surplus of £90,438.

The Recent Scarcity of Water at the East-End.—Owing to the recent rains, the water available for distribution by the East London Company has considerably augmented. Last Tuesday, the officials of the Company reported that since the previous Saturday there had been an increase in the volume of water stored in the various reservoirs of upwards of 50 million gallons; and during the day there was a further accretion to the extent of some 15 million gallons—making a total of 65 millions. By last Thursday, this had risen to 100 millions. In most of the districts at the East-end, the five hours' intermittent supply is being so managed as to allow of an hour's service in the evening. The crisis may now be regarded as past; and the constant service will be restored at the earliest possible moment.

GLASGOW CORPORATION GAS AND ELECTRICITY SUPPLY.

The Annual Accounts.

The accounts of the Gas and Electricity Department of the Glasgow Corporation for the year ending May 31 last were submitted to the Town Council on the 1st inst. by Mr. MITCHELL, who has succeeded the late ex-Bailie Ure as Convener of the Works Committee.

The report on the Gas Department stated that the gross revenue amounted to £629,362; and the gross expenditure, to £489,910. To the latter was added £67,518, depreciation written off capital; making together £557,428, and leaving a balance of £71,933 to go to the profit and loss account. The Committee had to meet the following requirements during the year: Annuities on stock, £33,603; interest on borrowed money, £27,997 (together £61,600); and sinking fund, £5350; making altogether £66,950, and leaving a surplus on the year's operations amounting to £4983. There was a balance of £164 brought from the previous year; and this, added to the surplus from last year, made £5147. Out of this there was made good the loss on the electric lighting account, amounting to £1527; and £3500 was transferred to the fire insurance fund—leaving £120 to be carried forward.

The income from residuals last year showed an increase of £27,000; the average price for coke having been nearly 1s., and of ammoniacal liquor and tar, about 6d. per ton of coal carbonized, more than in the previous year. While the Committee anticipated a considerable decrease in the income from ammoniacal liquor and tar during the current twelve months, they, having regard to the favourable results of the year's operations, and to the decreased price at which the coal required had been purchased, felt they were justified in recommending that the price of gas should be 2s. 4d. per 1000 cubic feet—being a reduction of 2d., and the lowest price at which gas had been supplied in Glasgow; the reduction to take effect retrospectively as from the date of the last survey. The quantity of gas sold or accounted for during the year was 4,029,107,000 cubic feet—an increase, as compared with the previous year, of 7·11 per cent. The sinking fund, with its accumulations, now stands at £297,804.

The works and mains were maintained in a state of efficiency during the year. The alterations and additions which were carried out at Tradeston and Dawsholm works proved of great advantage in the manufacture. The Committee stated that the construction of the new gasholder at Tradeston, contracted for in March last, was being proceeded with, and there was every reason to hope that it would be ready for use before the winter of next year. About five miles of new mains —principally 24 and 18 inches in diameter—are at present being laid, which will improve the supply of gas in several districts. Notwithstanding the severe frost of last winter, which did considerable damage to the gas-pipes throughout the city, the gas unaccounted for during the year was 10·90 per cent., as compared with 11·97 per cent. in the preceding year. The greatest quantity of gas sent out during the year in 24 hours was 26,077,000 cubic feet. The maximum daily make was 23,313,000 cubic feet. The number of meters in use on the 31st of May last was 166,574; being an increase of 4500 over the number at the corresponding date in the preceding year. During the twelve months reported upon, 17,386 meters were repaired; 13,101 were examined while in use, of which 10,920 were found in a satisfactory condition, while 2181 were defective and were removed. The number of gas-stoves let out on hire was 12,135; being 1136 more than the number on hire at the corresponding date last year. The number of gas heating and cooking appliances sold during the year was 1694.

The sum payable in annuities upon £415,000 stock of the old Gas Companies is £34,762. Of the amount of loan capital authorized—£1,000,000—there has been borrowed £903,535; leaving £96,465 to be raised. The capital value of the Dalmarnock station and works is entered in the accounts at £103,534; the Dawsholm station and works, at £244,131 (including an addition of £14,095 during the year); the Tradeston station and works, at £133,828 (including an addition of £3719 during the year); the Temple station and works, at £140,413 (including an addition of £1000 during the year); the Old Kilpatrick station and works, at £6032; and the Pollokshaws station and works, at £3206. The chemical works at Dawsholm are entered at the capital value of £6660; and the chemical works at Tradeston, at £9227. The capital value of pipes, including the cost of laying, is put down at £287,960, which includes an addition of £16,866 during the year. Gas-meters are entered at £154,480, inclusive of an addition of £14,774. In the gas-stoves account, the value is entered at £25,080. The total capital account is £1,140,426.

In the revenue account, the cost of coal (487,382 tons) is stated at £264,060; of purifying materials, at £15,202; the salaries of engineers and officers of works, at £4732; workmen's wages, at £76,251; repairs and maintenance of works and plant, machines, apparatus, tools, materials, and labour, at £44,224; and carting and stabling, at £5253—making a total in the manufacturing department of £409,725, as compared with £382,089 in the preceding year. Distribution of gas cost £50,669, as compared with £44,372; rents, rates, and taxes, £20,687, as compared with £20,110; and management, £8718, as compared with £8986. There were no law and parliamentary charges; and retiring allowances to old servants of the Companies amounted to only £110. The amount derived fom the sale of gas was £496,285, as compared with £463,457; from coke, £46,693, as compared with £38,514; from ammoniacal liquor and tar, £83,849, as compared with £65,084; and from waste lime, £1084, as compared with £675. Mortgages to the amount of £233,435 have been redeemed.

In the electric lighting department, it was stated that the gross revenue amounted to £21,196, and the gross expenditure to £11,987. To this there was added £5151 for depreciation; leaving a balance on the profit and loss account of £4057. Out of this the Committee had to meet: Interest on loans, £4254; and sinking fund, £1330 (together, £5584)—producing a deficit of £1527, which was made up out of the gas account, in terms of the Electric Lighting Provisional Order. The reduction in the price of electricity sanctioned by the Town Council last year was expected to be more than met by an increase in the quantity consumed. The Committee expressed regret that this anticipation had not been realized; the increase due to new consumers being counteracted by the discontinuance of supply to one or two important customers, which, however, it was believed, would be, to some extent, temporary. Notwithstanding the adverse result of the year's operations, the Committee recommended that the price of electric current should be continued at 6d. per Board of Trade unit. While interest and sinking fund had been charged on the capital of the works, including additions during the year, the full benefit of the increased capability of supply thereby secured could, they remarked, only be felt gradually, when no doubt a better result would be obtained. The additional plant referred to in last year's report had now all been laid down, and was ready for the coming lighting sesaon. The number of consumers on May 31 last was 586; being an increase of 208 over the number on the same date last year. The quantity of electricity sold to private consumers, irrespective of public lighting, was 714,362 Board of Trade units—an increase of 31·51 per cent. over the preceding year. In the capital account, it was stated that, of the total amount authorized—£200,000—there had been borrowed £133,000; and £2000 had been repaid. The John Street station (land and buildings) is entered as of the value of £2137; and machinery and plant at £6162. The Waterloo Street station (land and buildings) is entered as of the value of £19,919; and machinery and plant, at £31,432, which includes an addition of £7688 during the year. Mains and cables are put down as being of the capital value of £60,613, which includes an addition of £10,763 during the year; transformers are charged at £400; meters and certifying fees, at £5116, inclusive of an addition of £1258 during the year; and the royalties account is stated at £425. In the revenue account, coal cost £2117, as compared with £1617 in the preceding year; and the total generating charges are stated at £6702, against £5897. Distribution charges amounted to £1752, as compared with £1104; and management cost £1143, against £1250. The amount derived from the sale of current to private consumers was £17,850; from public lighting, £2671; from the hire of meters, £535; and from the hire of electric lighting machinery, £139. The quantity of electricity generated was 1,022,730 Board of Trade units, of which there were sold, to private consumers, 714,362 units; and supplied to public lamps, 186,925 units —leaving 922,115 units, or 9·83 per cent., unaccounted for.

At a meeting of the Sub-Committee on Works, held on the 24th ult., there was read a report from Mr. Foulis in regard to the opening up of streets for laying down gas and water pipes. Mr. Foulis informed the Committee that it had always been the practice of the Gas Department, when laying pipes in crowded thoroughfares, to have as much as possible of the work done when the traffic on the streets was least; but about nine-tenths of the work must be carried out during daylight, for the reason that it would be unsafe to use lights in the trenches while making gas connections.

Mr. MITCHELL, in submitting the report of the Committee, said the history of the past year's working amply justified the hope expressed in last year's report that a favourable result would be obtained. At one time, indeed, in the midst of a long, disastrous coal strike, it seemed as if the result would be very different; but, thanks to the continued efforts of the Committee and officials, the loss sustained by purchasing coal during a suspension of contracts was minimized as far as possible, and an increased consumption of gas, a favourable price for residual products, and extended use of mechanical appliances, had all combined to enable the Committee to lay before the Council a favourable retrospect of this great commercial department of the Corporation, the revenue of which now amounted to upwards of £650,000. Regarding the Gas Department, and how the profit had been dealt with, he had only to repeat what had already been announced—that, following a policy which had always been the aim of the Gas Committee, they had pleasure in recommending that the consumers should immediately participate in their prosperity, and that the price of gas should be 2s. 4d. per 1000 cubic feet, from the date of the last survey; being the cheapest price at which gas had been supplied in Glasgow. The only important expenditure being incurred at present was for the last new gasholder at the Tradeston station, which would be second only to that at Dawsholm, and when completed would afford a great additional security for a continuous supply of gas during dark and wintry weather. In the Electric Lighting Department, the Committee regretted that a profit had not yet resulted. No doubt this would be altered in the near future. In the circumstances, the Committee did not propose to alter the price of 6d. per Board of Trade unit, at which electricity was at present supplied. Mr. Mitchell, on behalf of the Committee, referred feelingly to the loss of Mr. Ure, their honoured and respected Chairman.

Mr. W. F. ANDERSON called attention to Mr. Foulis's report as to the opening of streets, and expressed regret that it was not more favourable. He admitted that emergencies arose to cause the streets to be opened. To this no one would object. But unless a promise could be given that the desire of the Statute Labour Committee would be carried out, he would have to enter his dissent.

Mr. W. STEVENSON said the report really carried out all that was needed; for, as far as possible, Mr. Foulis promised that he would consult with the Master of Works.

Mr. R. ANDERSON said he was one of the deputation from the Statute Labour Committee to the Gas Committee on the subject; and he recognized that the report of Mr. Foulis met all the Statute Labour Committee desired, and this was also the opinion of the Convener of the Committee.

The minutes and the motion of Mr. Mitchell were approved.

Welsh Watersheds and Water Schemes.—At the quarterly meeting of the County Council for Monmouthshire last Wednesday, Alderman Grove brought forward the subject of the decreasing limits of water-gathering areas in Wales; and, on his motion, the following resolution was passed: "That in view of the rapidly decreasing area in Wales and Monmouthshire available as gathering-ground for the supply of water, and of the possibility of still further inroads being made by English corporate bodies, it be referred to the Parliamentary Committee to specially report to the Council at its next meeting as to what steps, if any, can and ought to be taken for the conservation to this county of such areas as may be necessary for the adequate supply of water."

STOCKPORT CORPORATION GAS SUPPLY.

The Quality of the Gas.

At the Meeting of the Stockport Town Council last Wednesday, the subject of the quality of the gas supplied by the Corporation came before the members on a motion submitted by Mr. Burrows. It was as follows: "That an independent and competent person be appointed by the Council to act under the direction of the General Purposes Committee, whose duty shall be to examine and report upon the pressure, quality, and illuminating power of gas supplied by the Corporation, and that all such reports shall be entered in a book kept for that purpose." In support of his motion, he inferred that the quality of the gas was affected by the cremation of dogs' carcases at the gas-works. The effect of the motion was not startling, for nobody seemed inclined to second it. After a protracted pause, however, Mr. Fairbrother did so; expressing the opinion that general satisfaction would be given if it were passed. Dr. Hyde Marriott supported the motion in a speech in which he gave the Council a few scientific details in regard to the manufacture of gas. He stated that experiments had been tried by Mr. Bell at the gas-works; and he thought the Corporation ought to have a small destructor to get rid of the refuse. Mr. Redfern characterized the motion as an insult to the Gas Committee, inasmuch as it proposed to appoint an officer to supervise the work of the Gas Engineer (Mr. S. Meunier), and to set him above the Committee. He thought Mr. Burrows had shown bad taste in bringing forward his motion when the Chairman and Vice-Chairman of the Committee were absent. It would have shown better taste if he had adjourned it for a month. Mr. Burrows really wished to override the Council. Mr. Roscoe said the Committee were doing all they could. They were erecting a testing-house. Mr. Bell said he ought to make a few remarks with reference to burning dogs. Alderman White some time ago spoke about burying them; but the late Alderman Marshall advised that the carcases should be destroyed in the furnaces at the gas-works. It had been done in Birmingham without any detrimental results. The dogs could be destroyed in the simplest manner possible. The Mayor (Mr. F. R. Robinson, J.P.) remarked that, in the absence of the Chairman of the Gas Committee, he might state that he had been a member of the Committee for fourteen years. If Mr. Burrows' statements were true, the public would not long continue to consume the gas supplied. The dogs referred to were put into the furnace; and the products could not come in contact with the gas. With regard to the illuminating quality, if the light were of 8-candle power only, as had been stated, it was invariably the fault of the meter or the fittings. If the consumer sent to the Gas Office, he could have all his fittings inspected and put right. Up to 1888, an Analytical Chemist was employed. But the Council came to the conclusion that his services were of no use. The present Gas Engineer was quite chemist enough to determine the composition of the gas so far as sulphur and ammonia were concerned; and these were the two ingredients detrimental to health. Mr. Burrows having disclaimed any intention of offering an insult to the Committee, the motion was put, and lost.

OIL GAS ENRICHMENT COMPANY, LIMITED.

The Second Annual General Meeting of the shareholders of this Company was held in Edinburgh on the 29th ult.—Mr. WALTER THORBURN, M.P., in the chair.

The SECRETARY (Mr. J. G. Mason, S.S.C.) having read the minutes of the first annual meeting, the report and accounts, already noticed in the JOURNAL, were presented.

The CHAIRMAN, in moving the adoption of the report, expressed regret that it was not so favourable as regards dividend as it was last year. The reasons were, he said, not far to seek. First of all, the price of cannel coal had been very much reduced; and, on the other hand, the price of oil had been very much increased. The effect had been, in the meantime, to deter gas companies from going in for the Company's process. The Directors might have prepared the balance-sheet to show considerably better than it did; for £547 15s. had been entirely written off. This sum was incurred in connection with foreign patents and experimental work which had been going on during the past year; and it might have been added to the preliminary expenses, and only a proportion taken off. But, having written off this large sum entirely against the profits of the year, they had not deducted anything from the balance of preliminary expenses, which stood at £487 10s. 5d. Another reason why this large sum had been written off was that they came into possession of a sum of £250 in connection with a foreign patent, which, at one time, they scarcely expected to have. This money had been put into the year's profits. The introduction of the Peebles process had not gone on at the rapid rate the Directors had reason to expect it would, for the reasons already given; but the reports from the different works where it had been adopted were of the most highly favourable description. It was stated—and the Directors investigated the matter at once—that, during the severe weather in the winter months, the enriched gas had been condensing and choking up the service-pipes. This they found to be absolutely untrue. He thought the proprietors would agree that there were most satisfactory indications that the process would develop to a very large extent in this country. He would not go any further into the matter, because Mr. Beilby would be able to give much more information about details than he could.

Mr. G. T. BEILBY, in seconding the motion, said the Chairman had referred to the very great effect on the business of the Company of the extraordinary fall there had been during the year in the price of cannel coal. He thought they might safely put that down at from 60 to 70 per cent. It must be evident to them all that a gas manager would be the first to appreciate this great fall, and that, when he found his old enriching material supplied to him at this extremely low rate, it was very natural he should think that for some time yet he would adhere to his old friend, the cannel, and not take up the process the Company offered him. In the next place, there was the change in the price of oil. This change was only now coming into effect as regarded gas oil. He thought in the past there had been simply a fear that the shale oil producers were going to take advantage of the rise in the value of lamp oils to make gas managers pay much more for their enriching material. So far as he had any experience of the rise in the price of gas oil, it did not amount to more than about 7s. 6d. per ton. It was quite possible that the rise might become much more serious; but this rise, fortunately for them, might have a great value. It might be in the minds of some that Mr. Young originally invented the Peebles process expressly to deal with a low class of oil, which had never before been available for enriching gas. Mr. Young, so far as he (Mr. Beilby) remembered, began experimenting with blast-furnace oils and tar, and oils of a low class, which nobody had been able to employ before; and the remarkable success of his process, which took everybody by surprise, was that he had been able to use those oils. Now, the producers of shale oils were last year offering a once-run oil of from ·830 to ·840 specific gravity at 2½d. per gallon. That was practically giving away a large portion of the lamp oil along with this low-priced oil. They were doing so in order to induce gas companies to take the oil and use it in combination with water-gas processes. It was quite to be expected that, when the oil companies were getting 100 per cent. more for their burning oils, they would not continue to supply water-gas companies with highly-refined oil at this extremely low price. He thought Mr. Young shared the view with him that the Peebles process would be helped rather than hindered by this rise, because the gas companies would be forced back upon the oils with which the process dealt so successfully; and these oils were not likely to rise much above the prices of the last few years.

The report was adopted.

HINCKLEY DISTRICT COUNCIL GAS SUPPLY.

Report by the Engineer on the Works.

An important report upon the position of the Hinckley District Council Gas-Works in relation to the growing demands upon them has been addressed to the Gas Committee by the Engineer (Mr. G. Helps); and it is manifest from the facts contained in the document that an extension of the plant must be speedily taken in hand. The Committee, Mr. Helps says, have already been considerate enough to record the fact that the responsibility with regard to failure or insufficient supply of gas caused by inadequate plant is not his; but the language in which the first paragraph of the report is framed indicates the gravity of the position of affairs. It reads: "That no persistence on my part shall be wanting, and in order that you may be as fully aware of the facts as myself, with regard to the serious consequences likely to follow another attempt to pull through a winter season with existing plant, I feel it my duty to once more endeavour to point out how probable it is a failure of supply will occur—in fact, in my opinion, under ordinary working conditions (*i.e.*, making allowances for breakdowns, &c.) is bound to occur." Mr. Helps proceeds to give the figures as to the consumption of gas during the past five years, to show how the demands on the works have been increasing. In the year ending March, 1891, the consumption amounted to 25,615,800 cubic feet; March, 1892, 27,595,400 cubic feet; March, 1893, 28,952,600 cubic feet; March, 1894, 30,400,200 cubic feet; March, 1895, 37,934,300 cubic feet. Since March, 1894, Mr. Helps has made (including the present one) ten reports to his Committee upon the various requirements at the works, and in all of which he has urged upon them the insufficiency of the plant. From the date of the first of these reports, the consumption has increased 25 per cent. The position now in relation to the coming winter's work is thus described by Mr. Helps: The heaviest day's consumption last winter was 247,000 cubic feet; and the probable heaviest day's consumption next winter may be taken as 10 per cent. more—271,700 cubic feet. To meet this, 55 retorts of existing section are required under fire in good condition, and 20 per cent. more for emergencies, making the number of retorts required 66. There are at present 55 retorts, 34 of which are only in second-class order, having been lighted up when green, and having already done two seasons' work. Two exhausters, with engines, are required, each capable of passing 11,000 cubic feet per hour at 80 revolutions. The existing exhauster will only pass (at 80 revolutions) 5000 cubic feet per hour; and the works possess but one gas-engine and an old steam-engine. A scrubber is needed, capable of purifying 11,000 cubic feet per hour. The existing scrubber can only properly take 1700 cubic feet per hour. The purifiers should be capable of purifying 11,000 cubic feet per hour; but the present boxes will only deal with 5000 cubic feet. The holders should be capable of storing 270,000 cubic feet; the existing storage being only 200,000 cubic feet. A compensating governor capable of passing 40,000 cubic feet per hour is required. The present governor is not compensating, and is only properly capable of passing 30,000 cubic feet per hour. Mr. Helps also points out that, in speaking of existing requirements, the sizes of apparatus given must not be taken as representing what he should recommend to put down, as in extensions a margin must be left for future increase.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The 54th ordinary general meeting of the Chester United Gas Company was held at the offices last Wednesday—Mr. J. Gamon presiding. The notice convening the meeting having been read by the Secretary (Mr. J. Pye), and the audited accounts, with the Directors' report, laid before the meeting, the Chairman moved the declaration of an interim dividend in respect of the past half year. In doing so, he called attention to the fact that the revenue account showed a substantial increase in the sale of gas, amounting to nearly 8 million cubic feet, attributable largely to its use for heating purposes during the exceptionally severe weather experienced in the early part of the year, as

well as to its more general adoption for cooking purposes. The result of the half-year's working showed an increased revenue of £1221, of which sum the additional working expenses absorbed £685; leaving a net increased balance of profit of £536. Remarking upon the satisfactory condition of the Company's works and plant, he congratulated the proprietors on the healthy outlook for the future; pointing out that during the past half year 59 additional cookers had been sold and fitted up on hire, while 40 gas-fires had been supplied and fixed during the same time—being largely in excess of the business of any previous similar period. Alluding to the subject of public lighting by means of incandescent gas-burners, he remarked that the Directors had, by way of experiment, introduced clusters of these burners into the lamps in the Town Hall Square; though in their opinion, as well as in that of their Manager (Mr. R. Hunter), this was not the most advantageous place, owing to the extra height of the lamp-columns there. However, they had not felt justified in incurring further expense in this direction, in view of the intimation conveyed through the Press that it was the intention of the Town Council to undertake the lighting of some of the streets by means of electricity. In concluding his remarks, the Chairman intimated that the policy of the Directors would now be to build up the reserve fund, which last year was reduced by £2112 to meet the deficiency owing to the coal strike, and also to form a contingency fund; and when this had been done, he hoped they might be in a position to make a further reduction in the price of gas. The motion having been seconded by Mr. J. Hignett, J.P., it was carried unanimously; and the meeting closed with a vote of thanks to the Chairman and Directors, and to the officers of the Company.

The half-year's receipts of the Grantham Gas Company amounted to £9115, and the outlay to £6641; leaving a balance of £2474. Dividends of 5 and 3½ per cent. for the half year have been declared.

The Kildwick Gas Company have made a total profit for the past twelve months—including £321 brought forward, and deducting £200 for depreciation—of £2167. An interim dividend of 2½ per cent. was paid; and a further dividend of 3 per cent., less income-tax, has been declared—making 5½ per cent. for the year. A sum of £250 has been placed to the reserve fund; and the remaining balance of £322 is to be carried forward.

The annual meeting of the Paignton Gas Company was held last Wednesday week—Mr. F. Palk presiding. The Directors reported an increase in the consumption of gas; but they stated that the expenditure on revenue account was larger than in the previous year—owing partly to the salary of a duly qualified Manager and the interest on loan account. Negotiations were pending for a loan on mortgage of the undertaking at the rate of 3½ per cent., which would considerably reduce the interest account in future years. The available balance in the bank was £564, to which must be added £1652 due to the Company to June 24. After paying 4 per cent. on the preference shares, the Directors recommended a dividend of 8 per cent. on the ordinary shares, which would absorb £1104. The report and statement of accounts were adopted. At an extraordinary meeting held subsequently, it was resolved to increase the capital of the Company by the issue of 100 preference shares (£10), to bear dividend at the rate of 4 per cent. per annum.

The Directors of the Poole Gas Company, Limited, had a very cheering report to present to the shareholders at their half-yearly meeting yesterday. A profit of £1235 was made in the six months ending June, compared with £1100 in the first half of 1894; and the consumption of gas showed the material increase of 7·85 per cent. With this bright state of affairs, and a favourable contract having been made for the supply of coal for the current year, the Directors recommended that a reduction of 3d. per 1000 cubic feet be made in the price of gas from the end of June last. The payment of the maximum dividends on the stock and shares was proposed.

The Scarborough Gas Company derived from their working last half year an income of £17,418. The sum received for gas was £13,822. The quantity of gas delivered to private consumers was 87,402,200 cubic feet; and 8,696,359 cubic feet were supplied for public lighting and under contract. The rent of meters, fittings, &c., came to £544; and of stoves, to £209. Coke, tar, and ammoniacal liquor yielded £2793; and three other small items produced £50. The total expenditure was £12,988, made up of the following figures: Manufacture of gas, £10,715; distribution, £1013; public lamps, £518; rates and taxes, 6s. 9d.; management, £659; bad debts, &c., £82. The balance of revenue is £4430. The net revenue, including £2394 brought from last account, and after deducting all interest charges for the half year, is £6300. Out of this, after providing for dividends on the preference stock, the Directors recommend the payment of the maximum dividends upon all other stocks, less income-tax. The payment of these will absorb £5351; leaving a balance of £948 to be carried forward. The increased consumption of gas during the half year has, the Directors say, been most satisfactory; and the continued and growing demand for all classes of appliances for cooking and heating encourages the belief that this increase may be fully maintained in the future. The introduction of prepayment meters has also proved very successful. Regarding the works, the erection of retort-settings upon one of the most modern systems of regenerative heating is being rapidly proceeded with; and the station governors and the trunk mains connected therewith have been rearranged. Referring to the Company's new Act, the report mentions that arrangements have been made for raising the first portion of the capital authorized.

The Weymouth Consumers' Gas Company had an income last half year of £6677. Of this £5231 was produced by the sale of 27,421,700 cubic feet of gas; and £1080 was obtained from coke, tar, and sulphate of ammonia. Meter-rents yielded £125; gas-fittings, £237; and transfer fees, £2 5s. The outlay totalled to £4693; so that a profit of £1984 was made. The balance on the net revenue account is £3281. Commenting upon the half-year's finances, the Directors remark that both the receipts and expenditure have been heavier than they were in the corresponding half of 1894. The exceptional severity of the weather during the early months of this year caused an unusually heavy consumption of gas; and the demand for coke was also brisk. All the other items of receipts show an increase, except sulphate of ammonia, the market for which has been slack, and the prices depressed. Coal has cost more, consequent upon an increased quantity being used; and the expenditure on repair and maintenance has been unprecedentedly high, owing to one of the gasholders being demolished to make way for a double-lift holder of about twice the capacity of the old one. This alteration has been rendered necessary in consequence of the gas consumption having outgrown the storage room; and a portion of the cost of the work has been debited in these accounts. The profit of £1984 is barely sufficient to cover the maximum dividends; but the undivided balance permits of the usual payments being made—viz., 10 and 7 per cent. on the ordinary "A" stock and ordinary shares.

Water Companies.

The receipts of the Dorking Water Company for the half year ending June amounted to £1309; and the expenditure, to £526—leaving a profit of £783. The effect of the long frost in the first quarter was not overcome till the beginning of May; and this was immediately followed by severe drought, which continued to the end of the half year. Owing to the very large loss of water through waste in the early months, the Company started, when the summer commenced, without any stock of water; and, although every effort had been made to maintain the ordinary supply, it has latterly had to be seriously curtailed, owing to the enormous use, or waste, for garden purposes. Matters are, however, righting themselves now with the change of weather; and the Directors are considering the question of augmenting the supply. After many years of useful work, the Managing-Director of the Company (Mr. W. J. Rossiter) is relinquishing this position; and Mr. J. Dawes, of the Henley Water-Works, has been appointed to succeed him. An interim dividend at the rate of 5 per cent. per annum has been declared.

The balance upon the half-year's revenue account of the Grantham Water Company is £5328. Of this it has been decided to appropriate £1750 in the payment of a dividend of 5 per cent. for the six months—carrying forward the substantial balance of £3578.

The report and accounts of the South Hants Water Company (which were noticed in last week's issue) were adopted at the recent meeting of the shareholders; and at a subsequent extraordinary meeting, a resolution was passed, authorizing the raising of additional capital to the extent of £20,000. In moving the adoption of the resolution, the Chairman (Mr. W. E. Darwin, J.P.) said the proposal was to issue more shares to enable them to extend the works. They had reached the end of the capital; and to carry on the necessary work, they had had to borrow £4000 from the bank. Since October last, they had expended between £9000 and £10,000 chiefly on new plant at the pumping-station. They were at the present time in negotiation with the authorities at Lyndhurst for supplying the village; and if they came to terms, it would involve a considerable outlay, which would, however, bring a tolerable return.

The Directors of the South Staffordshire Water Company report that the number of houses laid on during the half year ending June was 1073; making the total supplied 86,367. The gross amount of water-rates for the six months was £42,551, as against £41,378 in the corresponding period of 1894. After providing for interest on debenture and preference stock, the amount remaining for division (including £4779 brought forward) is £15,956; and the Directors recommend the declaration of a dividend on the ordinary stock at the rate of 5½ per cent. per annum, less income-tax. The amount of this dividend being £15,817, there will remain £139 for the credit of next half year. The small balance carried forward is entirely attributable to the extraordinary cost of maintenance and other losses (amounting to about £5000) arising out of the frost in the first quarter of the year. The report also announces the appointment as Engineer of Mr. H. Ashton Hill in succession to the late Mr. William Vawdrey. The proprietors are to be asked to empower the Directors to issue £30,000, the unissued portion of the £50,000 of new stock created by resolution at an extraordinary meeting held on Aug. 24, 1893; and also to create a further £50,000 of the new stock authorized by the Company's Act of 1893.

The half-yearly meeting of the Truro Water Company was held last Wednesday, under the presidency of Mr. A. C. Willyams. The Engineer (Mr. N. Trestrail) reported that 23,574,000 gallons of water were pumped during the half year, at a total cost for coal and coke of £83—a saving of 45 per cent. in cost of fuel as compared with the previous half year. The accounts showed a profit on the six months of £482, and a total balance in favour of the Company of £495. The cost of the new machinery erected last year was £1268, which had been advanced by the bank. The report was adopted, and a dividend of 3 per cent. was declared, while £250 was transferred to capital account. A statement presented by the Secretary (Mr. A. E. Adams) showed the progress made by the Company in the past ten years. In the corresponding period of 1885, the income from domestic supplies was £334; while now it was £609; and the meter supply yielded £412 now, as against £163 ten years ago. The annual average increase of revenue had been over £100. In 1885, the profit and loss account showed an adverse balance of £529; while now there was a credit balance of £495. In the interval, they had paid £1600 in dividends, and transferred £2500 to the capital account. As against an overdraft at the bank of £1663 ten years ago, they had now a credit balance of £600.

ELECTRIC LIGHTING NOTES.

Mr. W. H. Preece, who resides at Wimbledon, has long desired to see the district illuminated by electricity in place of the present system of oil lighting. As far back as 1884, he presented the then Local Board with a report on the subject. But the members were cautious men, and, although they frequently considered the question, nothing came of their deliberations. The new District Council are moving more seriously in the matter; and the work of advising them has passed from father to son. An elaborate report has been prepared for them by Mr. Arthur Preece, in which he draws attention to what is being done at Manchester, Liverpool, and Brighton. Instead of instancing large places of this kind to show the profit made, it would have been more to the point if Mr. Preece had been able to

name purely residential localities such as Wimbledon where successful installations are to be found. The present cost of lighting by oil averages £2 9s. 6d. per lamp; and there are about 725 lamps in the streets. The total cost of lighting is thus approximately £1800. If gas were installed in place of oil, the cost would be, according to a report previously submitted to the Lighting Committee by the Surveyor (Mr. Cooper), about £4 11s. 7d. per lamp; and therefore the total annual cost would be near £3320. Mr. Preece sketches two schemes—one for the lighting of the whole district, and the other the lighting of only the main streets, by incandescent electric lamps. In the scheme for the whole parish, he has estimated for 1000 lamps of 32-candle power for the public lighting, and 5000 lamps of 8-candle power for the private lighting. By this scheme, Mr. Preece estimates that, with a capital expenditure of £31,000, and for a total annual cost of £2350, the Council would be able to light the streets at an extra cost of 15s. 2d. per lamp, providing a demand arises for 3500 private lamps. The extra cost of lighting the streets by electricity will be £550. In the second scheme, which provides for the lighting of the main streets only, a plant to light 600 32-candle power public lamps and 3000 private lamps is estimated for. This scheme shows that, with a capital expenditure of £20,000, and a total annual cost of £2310, the Council would be able to light about 400 of the lamps at an extra cost of £1 6s. 6d., including 325 oil-lamps, provided a demand for 2500 private lamps arises. Even assuming that the private lighting is not taken up to the extent anticipated by him, Mr. Preece cannot see that it is possible for the annual cost of lighting by electricity to exceed the estimated cost of lighting by gas. With only 1000 private lamps connected, he does not think the annual cost of lighting the streets would exceed £3000. The District Council have, on the recommendation of a Special Committee on Electric Lighting, adopted the first scheme, and have agreed to apply to the Local Government Board for sanction to borrow £32,000 to carry out the work.

The last electric lighting loan of £10,000 which the Kingston-on-Thames Town Council applied for to the Local Government Board has been curtailed by £2228; the Board intimating that, so far as the items related to prospective expenditure, they can form the subject of another inquiry.

A full report by the Lighting Committee of the Liverpool Corporation on their proposals regarding the purchase of the undertaking and business of the local Electric Supply Company came before the City Council last Wednesday. The agreed purchase price, as already mentioned, is £400,000; and the transfer is to be completed on Sept. 2 next, or not later than Jan. 1, 1896. As to the total sum required to be borrowed by the Corporation, calculating interest at 2¾ per cent., and assuming a period of 42 years is allowed for repayment, and reckoning that the total capital required by the date when the purchase will be completed at £425,000, the annual charge to the Corporation for interest and sinking fund will be £17,187. If a period of 35 years is taken, the annual charge would be £19,064. As against this, the Corporation will have an undertaking which, for the year 1894, produced a net revenue of £20,908 after the payment of working expenses, maintenance, Directors' fees, and legal charges. The Directors' fees and law charges amounted in 1894 to between £900 and £1000; and as these charges will not be payable if the Corporation purchase the undertaking, the net revenue for the year, from a Corporation point of view, may be taken at £21,800. During the first six months of the present year, there has been, according to the Committee, a considerable increase in the business of the Company; the gross receipts from the sale of electricity showing an increase of £2500 on the receipts for the corresponding period of last year. During the first six months of 1895, the number of lamps has increased from 31,792 to 33,800. The Committee consider it is, therefore, reasonable to calculate that the net income from the undertaking for 1895 will be between £23,000 and £24,000, as against an annual expenditure by the Corporation of £17,187, if 42 years for repayment of the borrowed money is allowed, and as against £19,064 if 35 years is allowed. When the Corporation acquire the undertaking, they will be able, it is said, to increase the gross receipts in a short time by between £3000 and £4000 per annum by lighting the public buildings in the centre of the city with electricity instead of gas. This can be done almost entirely from the existing mains of the Company; and only a small capital expenditure will be necessary to carry it out. The amount paid to the Gas Company in 1894 for gas supplied to all the public buildings was £7065 2s. 10d.; and the sum paid in respect of those buildings in the centre of the city which could easily be lighted by electricity, was £3486 16s. 7d. In addition to this, it is pointed out that the Corporation will be in a position to consider the question of lighting the chief streets with electric light instead of gas, and of supplying electricity for motive power. The share capital of the Company consists of 50,000 £5 shares; and the Company have spent additional capital on the works to the extent of about £16,000 up to May 31 last. Since July 1, 1894, the Company have paid a 6 per cent. dividend. By their Provisional Order of 1891 they can pay a dividend up to 7 per cent., but after that point has been reached, one-half of the surplus profit must be applied in the reduction of charges, and the other half can be paid as additional dividend. By the purchase of the undertaking, the Committee point out that the Corporation will get the right of supplying the city with electricity into their own hands at a price which is undoubtedly a good one for the Company, but at the same time one which should give the Corporation, after paying interest and sinking fund, maintenance and working expenses, a considerable margin on revenue account. There is also, they say, every probability that the Corporation will be able to make substantial reductions on the present charges made by the Company for electric light. The adoption of the report was moved at the Council meeting by Alderman F. Smith, who remarked that the price of £425,000 might appear to be extremely high; but taking all the circumstances into account, he thought the purchase was desirable. Mr. Williamson also considered that five or ten years hence the Council would look upon the transaction as a very advantageous bargain. Sir Arthur Forwood regarded the arrangement as an improvident one from the standpoint of the Corporation. He admitted that in all probability there would be a large extension of the use of electricity; but it might have been far better to entrust the work to a private company, as in the case of the Gas Company, and enforce such conditions as would have proved advantageous to the Corporation. The whole business would be better and more economically worked in that way than under the management of the Corporation. Sir Arthur also criticized the financial details of the report, and said the Council were asked to pay £425,000 for property that had cost £265,000; giving the present shareholders a bonus sum of £160,000. He argued that a sufficient allowance had not been made for depreciation and renewals, and in that respect the interests of the ratepayers were not properly protected. Alderman Bowring, commenting upon the last speaker's observations, said he considered the bargain made with the Gas Company was the most unfortunate one the city had ever entered into. If they had had the foresight to acquire that undertaking in its early days, and when it was controllable, they would have done a very excellent thing for the community; and he was sure the Committee had done a very excellent thing in securing the Electric Supply Company's undertaking. The city paid dearer for gas than almost any other city in the kingdom; whereas Manchester made an enormous profit out of the supply, which was obtainable at a much cheaper rate. Mr. A. Taylor having expressed his entire sympathy with the action of the Committee, Alderman Smith replied on the discussion. He said Sir Arthur Forwood had failed to recognize that the action of the Gas Company was paralyzing the industry of Liverpool to a very large extent; and instead of the sale of shares working any benefit upon the citizens of Liverpool, it seemed to have acted in an entirely opposite direction. The report was then adopted.

The Salford Corporation electric lighting works, which are under the charge of the Gas Committee, were formally opened last Wednesday by the Chairman (Mr. R. Holland). There was a goodly company present, including the Mayor (Alderman Mottram), the Mayoress and other ladies, and the members and officials of the Corporation, among whom was the Gas Engineer (Mr. S. Y. Shoubridge). Before handing over the works to the Mayor, Mr. Holland addressed the company, and traced the proceedings in connection with the provision of electric light for the borough from 1892, in which year the Council decided to embark upon this new undertaking. At that time, he said, they did not intend to spend more than £15,000 upon the installation. But from the replies to a circular which the Committee sent to probable consumers, it was evident that this sum would be inadequate; and, on this being reported to the Council, they agreed to extend the scheme to the extent of £30,000, and to apply to the Local Government Board for power to borrow £50,000, to cover the first cost of the installation, and to meet future extensions. The amount actually paid to the present time was £29,206; and the balances due to the various contractors on the expiration of the period of maintenance would increase the expenditure to £34,338. Regarding the works, the Committee engaged Messrs. Kincaid, Waller, and Manville, of Westminster, to devise a scheme. The system adopted is the high-pressure alternating one, by which the current is supplied at a pressure of 3000 volts, and reduced by transformers at consumers' premises to about 100 volts. There are three sets of engines and dynamos at the generating station, each capable of supplying 2500 8-candle power lamps alight at one time, or 2800 lamps connected to the mains. As it is necessary to keep one of the sets of plant in reserve, the producing power of the station is equal to supplying 8300 8-candle power lamps connected to the mains. The fuel to be used in the boilers is coke from the Corporation gas-works. From trials that have been made, it has been found that not only has gas coke the great advantage of being a clean smokeless fuel, but it is a very economical one for steam-boilers. The cables have been constructed to supply 17,000 8-candle power lamps, and will therefore meet the requirements for a considerable time. At present, the Corporation have nineteen customers, who have altogether about 1000 lamps; and there are applications from others for a supply for about 500 additional lamps. The charge for current is 7d. per unit; but the Committee intend to reduce this as soon as they are able to do so. At the conclusion of the Chairman's speech on Wednesday, the Mayor said, as an Engineer, he was satisfied they had an excellent installation, creditable alike to the Contractor and the Corporation. Mrs. Holland then started the engines and switched on the current; and the engine-room and other parts of the station were instantly brilliantly illuminated.

In the annual report of the Berlin Town Council on the administration of the municipal gas-works, some interesting figures are given in regard to electric lighting in the city. There are in all 185 street arc lamps, 71 of which are alight all night; the remainder only burning up to midnight. For private purposes, there are 9932 arc lamps, 200,474 glow lamps, and 667 motors and apparatus. Of these, 4259 arc and 79,212 glow lamps are supplied by isolated plants, of which 251 are driven by steam, and 97 by gas engines.

THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

The Recent Scarcity of Water at the East-End.

It may be remembered that, at the meeting of the London County Council on the 23rd ult., the Water Committee brought up a report on the subject of the recent scarcity of water at the East-end, and recommended that a letter be written to the East London Water Company thereon, and asking for certain information as to the quantity of water pumped by the Company. The recommendation was agreed to; and on the following Thursday, the Clerk to the Council (Mr. H. De la Hooke) addressed to the Secretary of the Company (Mr. I. A. Crookenden) the following letter:—

Sir,—Numerous complaints having reached the Council of the interruption of the constant supply system in the area of the county of London supplied by the East London Water-Works Company, the Council, as the Metropolitan Authority under the Metropolis Water Act, 1871, feels it to be its duty to inquire into the circumstances; and I have accordingly been instructed to communicate with you on the

subject. In doing so, I am to point out the discrepancy between the position taken up by the Company before the recent Royal Commission and that now assumed by it with regard to constant supply.

When before the Royal Commission, the Company put in a statement, upon which it obtained the Commissioners' favourable report, to the effect that from its then existing works it was able to supply as follows:—

	Gallons per Day.
From the Lea and storage reservoirs	30,000,000
From the Thames	10,000,000
From the existing gravel springs at Hanworth . .	2,000,000
From the Company's existing wells in the Lea Valley	11,000,000
Total	53,000,000

From the report of the Water Examiner for the month of May last—the latest return available—the Council finds that the supply was as follows:—

	Gallons per Day.
From the Lea	38,608,294
From the Thames	5,598,180
From the wells and springs	6,956,125
Total	51,162,599

On comparing these figures with the statement placed before the Royal Commission, it appears that, though the quantity taken from the Lea exceeded the estimate by 8,608,294 gallons, the Company did not avail itself of its full power to draw water from the Thames to the extent of 4,401,820 gallons, and that its well supply fell short by 6,043,875 gallons.

These figures seem to the Council to justify a request for information; and I have been instructed to ask that the Company will be good enough to furnish answers to the following inquiries: (*a*) How much water the Company has drawn from the Lea in each week during the past four weeks. (*b*) How much it has drawn from wells in each week during the past four weeks. (*c*) How much it has drawn from the Thames in each week during the past four weeks. (*d*) How much it has drawn from gravel springs at Hanworth in each week during the past four weeks. (*e*) If the Company is not drawing the 10 million gallons a day which it is authorized to take from the Thames, what are the reasons why this has not been done.

I am to add that the Council's Engineer has been instructed to confer with the Engineer of the Company as to the best means of immediately improving the now insufficient and irregular supply; such conference to be without prejudice to the rights of the Council or the consumer to compel the Company to carry out its obligations.

Mr. Crookenden replied to the above letter on the 1st inst. as follows:—

Sir,—I am instructed by the Directors of the East London Water-Works Company to reply to your letter of the 25th ult.

My Directors regret that the contingency has happened of which they warned both Parliament and the London County Council, when their Bill was rejected on second reading, at the instance of the London County Council, in 1893, and that they have been unable to maintain a constant supply during the late unusual drought.

The Company, in promoting their Bill in 1893, stated that it was essential that they should have extended powers, both for storage and for pumping, in order to carry out their responsibilities towards the public. That Bill, which would have given them ample powers for both purposes, was opposed and defeated by the County Council, in the face of the following statement circulated at the time by the Company: "That the rejection of the Bill must jeopardize the water supply to a very large population in the East-end of London." If that Bill had been allowed to proceed, the capacity of the storage reservoirs of the Company would have at this moment been increased by nearly 200 million gallons, and their pumping capacity from wells by a daily amount of 3 million gallons.

My Directors are not aware of any legal obligation on their part to supply to the London County Council, as the Metropolitan Authority, the information asked for in your letter; but, as a matter of courtesy, and also because they are very anxious that the public should be completely informed of all the circumstances of the case, they beg to furnish you with the following particulars. But, before doing so, they wish to say that it is an entire misapprehension to suppose that the Company put any statement before the Royal Commission to the effect that they could supply from their then existing works 53 million gallons per day. The figures you quote are, indeed, but a part of a comprehensive estimate of the average daily quantity which the Company could supply in the year 1931 from their present sources when utilized to a further extent; and it is clear that no comparison can be made between that estimate and the daily quantity actually supplied in the month of May in the present year, when it is obvious that the existing sources of supply are not so utilized.

Now, dealing with the subject-matter of your questions:—

(*a*) The Company have drawn from the Lea and from the stock of water accumulated in their storage reservoirs, during the past four weeks, an average daily quantity of 29¼ million gallons. If the County Council had not opposed and caused the rejection of the Company's Bill in 1893, additional storage reservoirs, as before stated, capable of holding 200 million gallons, would by this time have been constructed; and the additional daily quantity available from such reservoirs during the same four weeks would have been 7 million gallons.

(*b*) The Company have drawn from wells during the past four weeks an average daily quantity of 6·7 million gallons. If the County Council had not opposed and caused the rejection of the Company's Bill in 1893, additional pumping machinery would have been at work, and the additional supply from wells would have been 3 million gallons. The additional supply from these two sources, amounting to not less than 10 million gallons per day, would have met the public demand; and the present suspension of constant supply should not have occurred.

(*c*) and (*d*) The Company have drawn from their Thames works 9·82 million gallons per day during the past four weeks.

All the above figures are computed from the pump displacements.

Throughout the past month, during the late unusual drought, the lowest quantity supplied by the Company amounted to upwards of 29 gallons per head per day of the population, after due allowance has been made for slip of pump. This minimum quantity per head (to which, be it observed, the supply has only fallen for seven days) is in itself a larger supply than the consumption per head in the majority of large towns. But had the works above alluded to, as asked for by the Bill of 1893, been in operation, the supply would have averaged at least 43 gallons net per head per day of the population all through the drought; and there should therefore have been no reason for the suspension of a constant supply.

We therefore emphatically declare, and wish the public to understand, that the responsibility for the present state of things rests with the London County Council. That body, in pursuance of their avowed policy of hostility to the Water Companies, thought fit to do their best to wreck the measure of 1893 on its second reading in Parliament. They succeeded, and the public are suffering accordingly. In 1894, the London County Council tried to repeat their tactics of 1893. This time they were happily unsuccessful; and the Bill of this Company passed its second reading by a majority of one. In due course, it became law; and the Parliamentary Committee to which it was referred recognized its urgency by inserting a clause to the effect that the new storage works should be proceeded with with all possible despatch. These were actually started within a week or two after the Act had received the Royal Assent. Contracts for the new pumping machinery were entered into with equal promptitude. In the early spring of 1896, the Company hope to be in the position as regards supply that they would have been in in 1895 but for the obstructive action of the London County Council before alluded to.

With regard to the conference suggested with the Engineer of the County Council, the Company most respectfully decline it. They feel that the conduct of this matter is, and ought to remain, their own. They are content to proceed according to the best independent professional advice obtainable in the event, by no means likely, of their thinking it necessary to fortify the action of their own experienced and highly-trusted Engineer.

The Company give you notice that they intend to take steps to make this correspondence public.

The following letter from the Solicitors to the Company (Messrs. Bircham and Co.), dated the 6th inst., appeared in *The Times* last Thursday:—

In your account of what passed at the meeting of the London County Council on Tuesday last [July 30], the report of the Parliamentary Agent to that body is referred to as containing the following statement: "There was no opposition on the part of the Council to the Company making additional works. He personally offered to the Company, under instructions and on behalf of the Council, that their Bill should be allowed to pass unopposed if they would withdraw the clause imposing arbitrary restrictions on the consumers, and limit the amount of capital to what would be necessary for the next two years, which would have carried them well over the time during which the Council would have to consider what steps they would take after the issue of the report of the Royal Commission." This statement is not correct, and we ask to be allowed to show: (1) That the Council did oppose the additional works. (2) That the clause imposing the arbitrary restrictions was withdrawn by the Company, and was not treated as a ground of opposition by the Council. (3) That the offer to withdraw the opposition was made conditional on the Company abandoning the capital for the storage reservoirs and pumping machinery.

The Council circulated a statement, in opposition to the second reading of the Company's Bill, which contained (*inter alia*) the following clause: "It is submitted, on behalf of the London County Council, that, as the evidence before the Royal Commission on Metropolitan Water Supply is practically complete, and their report will shortly be issued, it is inexpedient to confer further statutory powers on one of the Metropolitan Water Companies to increase its capital at the present time."

The following extracts from speeches made in the House of Commons by Mr. Stuart and Mr. Benn, the spokesmen of the Council, are taken from *The Times* "Reports of Parliamentary Debates," Friday, March 17, 1893:—

Mr. STUART proposed that the Bill be read a second time that day six months. He explained that he adopted this course at the wish of his colleagues representing East London, and on behalf of the London County Council; objection being taken to the substance and essence of the Bill. . . . . It was proposed to expend the money in obtaining an additional water supply from the Thames, from the Lea, or from wells. Every one of those questions was in dispute before the Royal Commission. There was no urgent necessity for this measure.

Mr. MELLOR said the House would, in his opinion, incur a very grave responsibility if they refused to send the Bill to a Committee upstairs, though it might be true that the promoters were asking more than they ought. But, after all, it was necessary to have a sufficient supply of water; and, if the House rejected the Bill, one of the objects of which was to maintain a sufficient supply of water, they would incur a very grave responsibility.

Mr. BANBURY said he was authorized by the Company to say that they were perfectly ready to withdraw the clause which enabled the Company to stamp all fittings, upon which the opposition of the Council appeared to some extent to be based. . . . . It was absolutely necessary that, in an increasing district, such as that for which these powers were sought, the Company should make every provision.

Mr. BENN said the County Council did not base their opposition on the clause referred to by the hon. member for Peckham (Mr. Banbury); but they thought that, on the eve of the issue of the report of the Royal Commission, to add this financial burden to the purchase which must come sooner or later, would be very unfair.

Not one word in the Council's circulated statement about the clause containing restrictions on the consumers; while in the House Mr. Benn positively denied that this was a cause of opposition. Not one word in either statement or speech offering any portion of the capital to the Company for the necessary works. The opposition of the Council was directed against the Bill, substance and essence, additional works and all. The so-called offer of a portion of the capital was this: At a meeting on the 16th of March, when the Engineer of the Company, we, the Agent to the Council, Mr. C. Harrison, and Mr. Stuart were present, it was stated that the Council would consent to the Bill if limited to a sum of £40,000 for the cost of laying down

mains for two years, but any portion for the needed works—*i.e.*, of the £150,000 for the reservoirs or the £100,000 for the extension of machinery and pumping power—would be strenuously opposed. The Company's advisers having stated that the reservoirs and extension of machinery, &c., were urgently needed if the supply was to be maintained, the meeting broke up.

If the report now put forward by the Council's Agent be correct, why did the Council again in 1894 strenuously oppose (fortunately without success) the Company's Bill, re-introduced that year, for reservoirs, &c., in which the clause as to fittings found no place? The report is an unfair attempt to evade the responsibility of the Council for having been instrumental in procuring the rejection of the Company's Bill in 1893.

Reference was also made on Tuesday to the report of the Council's Engineer, suggesting that the shortness of water may be attributed to the bursts in the Company's mains which have not been repaired since the frost. We are desired to state that the actual facts which are being collected, and will be produced at the proper time, will show that there is no foundation for this suggestion.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Reverting to the annual accounts of the Gas and Electricity Department of the Glasgow Corporation, it has to be observed that the quantity of gas sold, amounting to 4029 million cubic feet, was 268 million cubic feet greater than in the preceding year, when the price of gas was the same as last year—2s. 6d. per 1000 cubic feet—and 210 million cubic feet greater than in the year before that, when the price was 2s. 9d. The greatest quantity of gas sent out in 24 hours was 26 million feet, as compared with some 22¾ millions in the preceding year, and 25 millions in the year before that; and the maximum daily make—23⅜ million cubic feet—compared with 22 millions in the preceding year, and 24¾ millions in the year before. The number of meters in use show an increase, as compared with two years ago, of 7675. No mention is made in the Committee's report of the working of the water and oil gas plant; there being apparently nothing connected with it calling for special notice. The capital account was increased last year by £5000; and in the course of two years it has been raised by £136,903, which is largely accounted for by the outlay upon the new gasholder at Dawsholm, and the extensions and renewals there. The revenue from gas (£493,560) was £32,415 greater than in the preceding year, but £54,596 less than in the year before that, when the price of gas was 2s. 9d. The revenue from coke (£46,693) was £8179 more than in the preceding year, and £16,466 more than two years ago. From ammoniacal liquor and tar the receipts (£83,849) were greater by £18,765 and £40,057 respectively. The Electricity Department has not made the progress which was expected—in fact, although 199,039 more units were sold than in the preceding year, the deficit upon the year's accounts rose from £607 to £1527. Two years ago it was £1773. The capital account is, of course, larger, having risen £15,179 during the year, which necessitates greater outlay upon interest. But the revenue only increased by £3181, of which £2032 was due to sales of current to private consumers, and £979 to the increased charge for public lighting; while the expenditure also increased by £3153, of which £805 was due to charges connected with the generation of electricity, £548 to increased charges in the distribution department, and £842 to increased rents, rates, and taxes. It is evident that, in an undertaking where the expenditure increases at the same rate as the revenue, the prospects of profitable working are not very bright. The Committee are still hopeful of a better financial result, which is the feeling always of such bodies. Taken as a whole, the accounts are decidedly encouraging so far as the gas supply is concerned, but not by any means so in the case of electricity.

The second annual general meeting of the shareholders of the Oil-Gas Enrichment Company, who are the owners of the Peebles process, was held in Edinburgh at the end of last month, with Mr. Walter Thorburn, M.P., in the chair.* The proceedings were quite harmonious, though the dividend was only 5 per cent., as compared with 10 per cent. for the preceding year. The causes of the small dividend were explained by the Chairman to be the heavy expenditure the Company had had in connection with their foreign patents, all of which have now been secured, and the costs of experimenting by Mr. Young, at Peebles. Mr. Beilby's remarks, in seconding the motion for the adoption of the report, were exceedingly practical, and well worth perusing. Mr. Beilby is a great authority on oil matters; having been the joint inventor, with Mr. Young, of the retort now almost universally adopted for the manufacture of oil from shale, which is known as the Young and Beilby retort. Very satisfactory accounts were given regarding the prospects of the Company.

The Alloa Corporation Gas-Works, which are managed by Mr. A. Yuill, the President for the current year of the North British Association of Gas Managers, were profitably worked during the past year. Mr. Yuill, as is well known, is one of the staunchest supporters of the Peebles oil-gas process; and he has reason to be satisfied with it. A year ago the Corporation were, on account of the saving the system effected in working, able to reduce the price of gas from 3s. 4d. to 3s. per 1000 cubic feet; and at their meeting this year, they again reduced it to 2s. 10d. A further reduction might have been made; but the Corporation are erecting new sulphate and tar distilling plant, the cost of which will be taken out of revenue. Consumers will thus benefit by the saving on the oil to a greater extent than is represented by the direct decrease in price. The total output of gas was 44,242,300 cubic feet; and the quantity sold was 39,326,500 cubic feet. Gas unaccounted for amounted to 10·13 per cent. The net cost of gas sold was 2s. 11·95d. per 1000 cubic feet. The total revenue was £7207, as compared with £7094 in the preceding year. From gas, there was derived £6069, as compared with £6174; but the reduction in the price accounted for £600, with which added the revenue would have shown a large increase. Tar and liquor realized £501, as compared with £369; and coke and waste lime, £555, as against £468. In 1892-93, the sum derived from coke and waste lime was £390; so that, compared with two years ago, there is an increase of revenue from that source alone of £165, which is mostly due to the better price that is obtained for oil coke. There were carbonized during the year 4341 tons of coal, at a cost of £1830; and 68,777 gallons of oil, at a cost for oil and royalty, of £605. The total manufacturing charges amounted to £2675, as compared with £2331 in the preceding year. The balance carried to profit and loss account was £844, as against £842; and there is a balance at profit and loss account of £1341. There was an increase of consumers to the number of 108 during the year. The outlook in connection with the Alloa Gas Corporation is decidedly hopeful.

Among other places where the Peebles process of oil-gas manufacture has been adopted with success, is the town of Auchterarder, in Perthshire. Mr. A. C. Young is the Manager of the Gas Company there. Working without an exhauster, he obtains 21,566 cubic feet of gas per ton of oil, and 8638 cubic feet per ton of splint coal. The total annual make of gas is under three million cubic feet. Mr. Young states that, by reason of the better quality of coke derived from the splint coal which they used along with the oil, they were able not only to sell the usual quantity, but to keep sufficient coke for use during the summer, thus dispensing with the purchase of furnace coal. They have been offered 17s. 6d. per ton for their oil coke, delivered at Auchterarder railway station. With oil gas he found, during the past winter, that he had much less difficulty than in previous periods of frost in keeping up the illuminating power of the gas. There was no condensation whatever in the case of the oil gas. The most interesting part of the business is that Mr. Young, on receiving the estimates of offerers for the work of erecting the oil-gas plant, found that they amounted to £175; and thinking he could do the work cheaper himself, he set about it, and succeeded in putting up plant, to his own plans, at a cost of £95. I have seen the plans; and they show excellent workmanship. The plant has been worked during the winter season, and has given satisfaction. It is estimated that by its use a saving of £60 has been effected. The Company formerly gave gas of 28-candle power; and they now give 30 candles. As the price is 6s. 8d. per 1000 cubic feet, it would, I think, occur to most people to reduce the candle power to at least 25, and strike off a large slice from the price. I understand that a proposal to reduce the price of gas was entertained; but it was left over in view of the possibility of changes now in contemplation.

The Peebles process has also been worked during the past winter at Huntly, where the Gas Company is managed by Provost Bowman. It will be remembered that, at the meeting of the North British Association of Gas Managers in Glasgow last year, Mr. Bowman asked Mr. Young, the inventor of the process, how it would answer in very small works; and Mr. Young replied that they had no information on the subject. Mr. Bowman, however, tried the process; and the result has been that the Company have reduced the price of gas 5d. per 1000 cubic feet, while a further reduction is contemplated.

The Huyton and Roby Gas Company, and the Chorley Corporation, both in Lancashire, have adopted the Peebles process. The former has an output of 20, and the latter of over 60 million cubic feet of gas per annum.

Mr. W. Foulis, Engineer to the Glasgow Gas Corporation, has reported to the Perth Gas Commissioners, regarding the proposal to transfer the Perth Gas-Works to a new site, that he has no hesitation in stating that the site of the present works is more than fully occupied; that the crowded condition of the apparatus and buildings must interfere prejudicially with the economy of manufacture; and that although, by a certain amount of rearrangement and reconstruction of the apparatus, a small increase in the manufacturing capacity of the works might be obtained, yet that would only be sufficient to meet the increased demand for (say) two or three years, when the construction of new works would become absolutely necessary. For these reasons, he is strongly of opinion that it would be very unwise to incur further capital expenditure on the present works, and also that arrangements should at once be made for the construction of new works in a more suitable position. The proposed site at Sand Island appears to him to fulfil the necessary conditions; being in close proximity to railway sidings, and also to the harbour. The area, being about three times that of the existing works, would be sufficient to meet the requirements of the city for many years. From the plan and sections of the ground prepared by the City Surveyor, it appeared that the surface of the ground over the whole area was below the level of the water when the river was in flood, but that a good foundation could be secured about twelve feet below that level. The yard level should be made at least three feet above the flood-water level. The foundations would therefore require to be some 15 feet below the yard level. This would necessitate a considerable amount of underground building, and add to the cost of construction, which would, however, probably be compensated for by the price at which the ground could be obtained as compared with that of other sites, equally suitable in position. If that site were adopted, it would probably be necessary to acquire a strip of ground to the north of the site, so as to give a connection with the harbour railway on a workable gradient.

The annual accounts of the Forfar Gas Corporation were submitted this week. They show a total revenue of £6121, and an expenditure of £5606; leaving a balance, being free revenue to meet annuities, of £514. The annuities payable amount to £476; a surplus thus being left at the end of the year of £38. The revenue was made up as follows: Balance from revenue account of year ending June 15, 1894, £300; rates for gas consumed for current year, at 4s. 3d. per 1000 cubic feet (less discount to consumers), £5113; residual products sold, £707. During the year £2822 was expended for coal; on retorts, bricks, and fire-clay goods, £118; lime and oxide for purification, £99; wages to firemen, clerks, and labourers at works, £930; interest, £288; sinking fund (sum set apart and added to this fund out of the current year's revenue), £150; contingent fund, £136; and management, £202. The sinking fund amounts to £1187, and the contingent fund to £2926. The quantity of gas manufactured during the year was 28,446,700 cubic feet, accounted for as follows: Sold to consumers, 23,902,500 cubic feet; sold to Police Commission, 1,052,498 cubic feet; consumed at gas-works, 300,000 cubic feet; unaccounted for, 3,191,702 cubic feet, making the leakage 10½ per cent. The price of gas was last year

* A report appears in another column.—Ed. J. G. L.

lowered from 4s. 6d. to 4s. 3d.; and it is proposed to further reduce it to 3s. 9d. per 1000 cubic feet. Mr. Forbes Waddell has not yet been a year in charge of the works, and therefore comparisons cannot be made with former workings; but it may be pointed out that already the community of Forfar are benefiting by his vigorous and effective management.

In my "Notes" last week, I briefly mentioned that the Coatbridge Gas Company had declared dividends at the rates of 10 and 7 per cent. per annum. The amount available for the purpose was £3624. The revenue in the six months ending June 30 last was £6437; and the expenditure, £4719—leaving a balance of £1718. There was a sum of £2023 brought forward; making in all £3741, out of which had to come £117 for interest. The consumption of gas increased by about 2 million cubic feet in the half year, as compared with the corresponding period of 1894. At the end of March, meter-rental was abolished to the general satisfaction of the consumers. The works and plant, under the supervision of Mr. T. Wilson, have been maintained in an efficient condition; but, owing to the damage caused to the pipes by the severe weather early in the year, the percentage of unaccounted-for gas is exceptionally high.

The Kilsyth Gas Commissioners have reduced the price of gas from 4s. 2d. to 3s. 9d. per 1000 cubic feet; being able to do so on account of their having contracted for coal at an average price, for the year, of 9s. 7½d. per ton, which is about 2s. per ton less than last year's price. There was a profit on the past year's working of about £250; and the estimate this year is for a profit of between £500 and £600. The Commissioners are desirous of accumulating money to meet the cost of renewals of plant.

I am informed that on Sunday night last the newly-installed electric lighting in Nicolson Street, Edinburgh, did not give satisfaction—how, I am not aware—and that, in consequence, the incandescent gas-lamps which have been on trial there, and which had been superseded, had to be again lighted.

Sulphate of ammonia is quiet at £9 5s. per ton.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 10.

Sulphate of Ammonia.—The market has throughout the week been quiet; the tendency being again in the downward direction, and quotations at the ports have become so irregular that it is difficult to fix exact values. Consumers' orders are very scarce; the buying being mainly by dealers—showing conclusively that there has been extensive "bear" selling ahead. Makers in the North have all along put their stuff on the market as it has been produced, at current prices; thus securing a larger proportion of business than would otherwise have been the case. The sagacity of this policy is confirmed by the present weakness in the London market, and the lower prices now being accepted in that quarter.

Nitrate of Soda is quiet at 8s. 3d. per cwt. for fine quality on spot; and at 8s. 1½d. to 8s. 4½d., according to position and test, Autumn shipment.

LONDON, *Aug.* 10.

Tar Products.—Very little new business is reported; and there is no important change in the value of, or demand for, any of the products. Pitch is firm; but all the other tar products are distinctly flat. Anthracene maintains its nominal value, and is likely to do so. But there is a wild competition in alizarine; and sales are reported at very low prices—prices, indeed, which must mean a loss with the present value of anthracene. Several tar contracts have been let during the week at prices ranging between 17s. and 20s. 9d.; the difference in value being represented by the geographical position and quality of the tar. Other prices are as follows: Pitch, West coast, 34s. to 35s.; East coast, 37s. to 38s. Benzols, 90's, 11½d.; 50's, 11d. Solvent naphtha, 1s. 0¾d. Toluol, 1s. Crude, 30 per cent., naphtha, 4½d. Creosote, liquid, 1¼d.; ordinary, ¾d. Naphthalene salts, 21s. Cresylic acid, refined, 1s. 1d.; brown, 11d. Carbolic acid, 60's, 1s. 7d. Anthracene, "A" quality, 1s. 1d.; "B," 10d.

Sulphate of Ammonia does not improve; and although some parcels have changed hands during the week, no large business is being transacted at the fearfully low prices now being quoted. The following prices represent the market quotations of the week: London (Beckton), £9 6s. 3d.; London outside makes, £9 7s. 6d.; Hull, £9 7s. 6d.; Leith, £9 5s.; Liverpool, £9 7s. 6d.—in all cases, excepting Beckton, less 3½ per cent. f.o.b., including bags. Gas liquor is offered at 6s. 6d. to 7s. 6d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—There is no material change to report in the coal trade here. With regard to gas coal contracts, nothing new can be noted, except that one or two, including that for Salford, are still unsettled. Prices remain at last week's quotations. Partially screened Arley gas coal averages about 7s., and good Wigan four-feet 6s. 6d. per ton at the pit. In the general round coal trade, business continues very depressed; and supplies are largely in excess of requirements, even with pits working not much more than half time. In the better qualities, the demand for house-fire purposes continues to be restricted to the most limited dimensions; no increased weight of buying having as yet come forward to meet winter consumption. Prices, however, still average from 10s. to 10s. 6d. per ton at the pit for best Wigan Arley; 8s. 6d. to 9s., for seconds Arley and Pemberton four-feet; and 7s. to 7s. 6d., for common house-fire coals. In common round coals, there is perhaps less competition from Yorkshire collieries, as they are getting rather more busy on shipping orders, and showing less disposition to take the excessively low figures at which recently they have been pushing surplus supplies on this market. But prices generally are still cut very low, to effect sales in anything like quantity for prompt delivery. Good ordinary steam and forge coal does not average more than 6s. per ton at the pit mouth; whilst 5s. 6d. at the pit, representing about 7s. 3d. delivered at the ports, is a very common figure for shipment—even less being taken in odd cases. Some of the colliery proprietors, however, are holding to 7s. 9d. per ton as their minimum for good qualities of steam coal, delivered at the ports; and 8s. 6d. to 9s. per ton are about the average quoted figures, for delivery at the Partington Tips on the Manchester Ship Canal. As regards engine classes of fuel, the limited production of slack of course tends to cause rather a shortness of supplies at some of the collieries, which have consequently a difficulty in satisfying their customers' needs from their restricted output; but supplies are readily obtainable out of slack held in stock at many of the collieries. This tends to keep prices down; common slack being still obtainable at 3s. to 3s. 6d., and better qualities at 4s. 6d. to 5s. per ton at the pit mouth.

Northern Coal Trade.—There has been a large demand for coal in the last few days; and in the case of one or two collieries, a higher price is asked for their produce. The best Northumbrian steam coal has shown the upward tendency most markedly, because the period for shipment to the Baltic is now beginning to draw to a close; and some shippers have considerable quantities to send yet. Hence 9s. 1½d. per ton f.o.b. has had to be paid in several cases to secure cargoes for export during this and next month; and this has stiffened the general quotation of 9s. per ton. There is not so much pressure for second-class coal, and the price is unaltered at 8s. to 8s. 6d. per ton f.o.b.; whilst steam smalls are from 3s. to 3s. 6d. Gas coals are in better demand; and as the consumption increases appreciably every week, it is certain that there will be with each week a better demand for, and a fuller working at, the pits producing gas coals. The price for uncontracted lots varies considerably; some of the best collieries asking 6s. 9d. per ton f.o.b., whilst others quote 6s. 6d. and less. On the other hand, 7s. and even 7s. 6d. per ton is asked by two collieries that are exceptionally situated for certain markets. Some local contracts are in the market, including one of 32,000 tons for a seaside town, and others are impending; but in view of the uncertainty as to the labour question in Durham collieries, it is expected that there will be rather higher prices quoted than in recently-decided tenders. The coke trade is steady; and with fuller shipments, and an average local consumption, the prices remain at about 13s. to 14s. per ton f.o.b. There is no alteration in the gas coal trade, for the slightly-increasing production is well taken up, and seems tolerably certain to be so for some time.

Scotch Coal Trade.—There are indications of an improvement in the coal trade in Scotland, due to orders returning which were lost during the strike of the miners last year, and to the feeling which is abroad that trade generally is about to improve. Gas bodies, who last year mostly contracted for a six months' supply of coal, are now contracting for the whole year. Prices are hardening a little. The quotations are: Main, 5s. 10d. to 6s. per ton f.o.b. Glasgow; ell, 6s. 9d. to 7s. (full); splint, 6s. 3d.; and steam, 7s. 6d. to 7s. 9d. The shipments for the week amounted to 189,882 tons—an increase upon the quantity in the preceding week of 23,626 tons, and upon the quantity in the corresponding week of last year of 166,566 tons. For the year to date, the total quantity has been 4,144,168 tons—an increase upon the corresponding period of last year of 385,681 tons.

Incandescent Gas Lighting for Bradford Streets.—The Gas and Electricity Committee of the Bradford Town Council have appointed a Sub-Committee to consider an offer by the Incandescent Gas-Light Company, Limited, as to applying their system of lighting to all the Bray lamps within the borough.

The "Penny-in-the-Slot" System at Bolton.—At last Wednesday's meeting of the Bolton Town Council, Alderman Miles, the Chairman of the Gas Committee, referred to the increased demand for gas for heating and cooking purposes, and to the rapid extension of the "penny-in-the-slot" system to secure a supply of gas. From the books, he found that the Committee had now 1350 prepayment meters out. He thought this was a gratifying feature, because it represented so many persons who would not have been gas consumers but for this system. He added that the Gas Department had on hire 1694 cookers of various sizes, 1738 grillers, and 716 gas-fires. All this showed that the working classes of Bolton were taking advantage of the facilities offered by the department for the extended use of gas.

Suffocation by Gas at Liverpool.—A young girl, named Eleanor Woods, the daughter of W. T. Woods, of Northwold, Norfolk, was suffocated by gas last Tuesday night, at some cocoa rooms, in Manchester Street, Liverpool, where she was staying with her father before sailing for New York. In his evidence at the inquest, Mr. Woods stated that, on Wednesday morning, the gas-tap in the room was found turned full on. His daughter had had no experience of gas, as they did not use it at home. It was also stated that there was no fireplace in the bedroom, and the windows were closed; but there was an open ventilator. The Coroner (Mr. T. E. Sampson) observed that it ought to be the duty of the owners of all such places to have them properly ventilated, if only for health's sake. A verdict of "Accidental death" was returned.

The Price of Gas at Barnsley.—At the monthly meeting of the Barnsley Town Council last Tuesday, the Park and Lighting Committee reported that they had noted that at York the price of gas had been lowered from 2s. to 1s. 10d. per 1000 cubic feet, on account of the low cost of coal; and they regretted that they had been unable to secure a reduction in Barnsley. The Committee further recommended that the Town Clerk be instructed to apply to the Gas Company for a reduction in the price charged for gas supplied to the public lamps. Alderman Wray, in moving the adoption of the minutes, said the public might be satisfied with the price of gas; but he was not. He should continue to try to expose the charges. The Corporation were one of the largest consumers; and he thought they had a right to ask for a reduction. Mr. Charlesworth asked if it was advisable that the Committee should consider the question of purchasing the gas-works. He thought it was now time, as the shares would be getting more valuable. The Deputy-Mayor (Alderman Halton) thought these remarks were rather outside the minutes, which, after some further conversation, were adopted.

Reduction in Price.—The Dorking Gas Company have reduced the price of gas from 4s. to 3s. 9d. per 1000 cubic feet net.

Water-Works Extensions at Derby.—In addition to works, estimated to cost £22,500, which have already been ordered by the Water Committee of the Derby Town Council, permission was given them last Wednesday to spend £5500 in the construction of a filter tunnel to connect the existing tunnels with a proposed new receiving-tank.

West Bromwich Gas Supply.—At the meeting of the West Bromwich Town Council last Wednesday, the Gas Committee reported that the sales of gas for the Midsummer quarter amounted to 32,246,600 cubic feet, as compared with 31,688,000 cubic feet in the corresponding quarter of last year; and that the amount of gas-rental (exclusive of public lighting) was £3737, against £3652.

Additional Land for the Manchester Gas-Works.—The Manchester City Council last Wednesday agreed to a proposal of the Gas Committee that a piece of land offered by the Ship Canal Company, comprising between 3 and 4 acres, should be purchased for storage and other purposes. The immediate use to which the land is to be put is for the accommodation of oil-tanks, required in connection with the manufacture of water gas.

Gloucester New Water-Works.—In connection with the Newent water-works scheme of the Gloucester Corporation, the Water Committee recently invited tenders for the supply and construction of a steel girder bridge and line of water-pipes over the River Severn. The offers ranged from £1767 to £2488. The lowest tender was submitted by Messrs. J. Lysaght, Limited, of Bristol; and the Committee have recommended the Council to accept it.

Contemplated Water-Works Extensions at Worcester.—Some extensive improvements at the water-works are under the consideration of the Water Committee of the Worcester Corporation. New pumping engines have been talked of for some time past—the present ones costing a large sum annually for repairs—and a further extension of the filtering arrangements is now proposed. The outlay to be incurred is expected to amount to about £20,000.

A Large Loan for the Leeds Corporation Water Department.—The Leeds Corporation Water Committee last Friday decided to ask the City Council for authority to apply to the Local Government Board for sanction to borrow £100,000 under the powers of the Leeds Improvement Act, 1893, for water-works purposes. The loan is required for extensions of service-mains necessitated by the growth of the city, the construction of the 30-inch main from Eccup and Swinsty, the making of service reservoirs at Harehills and Beeston, the putting down of pumping-engines at Headingly, &c.

The Profits of the Wolverhampton Water Department.—The Water Committee of the Wolverhampton Corporation report that the profits for the year ended March 31 last, after paying interest charges on the capital and providing for the sinking fund, amounts to £4675. The income from sales of water has been £501 in excess of the previous year. The surplus of £3000 which appears in the balance-sheet on the revenue account will be forthwith transferred to the credit of the improvement fund. An agreement has been entered into with the Urban District Council of Bilston for the sale to them of the water-rights and water-mains of the Corporation in the Coseley area, and the water-main from Goldthorn Hill to the boundary of the township of Bilston, at the sum of £7750. The balance-sheet shows a total income for the year of £28,586, and an expenditure of £23,911.

New Joint-Stock Companies.—The Wingate and District Water Company, Limited, has been registered with a capital of £5000, in £1 shares, to supply water in the township of Wingate and elsewhere, in the county of Durham. Under the title of La Société Anonyme du Bec Auer pour l'Europe du Nord, a Company has been formed in Brussels, with a capital of £160,000, to acquire and exploit the Welsbach patents in Russia, Finland, Sweden, Norway, and Denmark. The Gas Power and Light Corporation, Limited, has been registered with a capital of £20,000, in £1 shares, to adopt and carry into effect an agreement, made by the Company with the London Traders' Trust Corporation, Limited, for the acquisition of certain patents, patent rights, &c., relating to improvements in the manufacture of gas, &c., and to turn to account the same. The registered office is at No. 20, Bucklersbury, E.C.

Sales of Stock and Shares.—Last Thursday, Messrs. Alexander, Daniel, Selfe, and Co., of Bristol, sold by auction £20,000 of 7 per cent. maximum consolidated ordinary stock of the *Bristol Water-Works Company*. The reserve was £145 per cent.; and the prices realized fluctuated between £145 2s. 6d. and £146 15s. The total amount produced was £29,126 15s.; being an average of about £145 12s. 6d. per cent.——£50 ordinary stock in the *Broadstairs Water Company* has been sold at £60; £85 of "A" stock in the *Broadstairs Gas Company*, at £180; and £75 "B" stock in the same concern at £110. A perpetual rent charge (minimum of £200 per annum guaranteed), payable by the *Maidstone Water Company* at the rate of 1d. per 1000 gallons of water taken from the Boarley Springs, has been sold for £5750.——Twelve £10 shares in the same Company were sold last Thursday by auction at £31 per share; and eight, at £30 10s. per share.

Colchester Water-Works Extensions.—Colonel J. O. Hasted, one of the Inspectors of the Local Government Board, held an inquiry at Colchester in reference to an application by the Council for a loan of £6250 for water-supply purposes. The Chairman of the Water Committee (Mr. J. Paxman) informed the Inspector that the new machinery they had put down cost £16,500; but the Committee asked, in the first instance, for a loan of £12,000, thinking that the other portion of the money could be taken from revenue. It was afterwards thought, however, that, as they were building sound, permanent works, it would be right to ask for an additional loan spread over as long a period as the authorities would grant. It was found that extra works were required. The water-tower was discovered to be insufficiently strong; and the Engineer (Mr. Wood) estimated that to do all that was necessary to secure absolute safety, would involve an outlay of £12,000 or £13,000. Some minor improvements were also explained by Mr. Paxman; and other witnesses were examined in support of the application.

The Acquisition of the Ystrad Gas and Water Company's Property by the Rhondda District Council.—A letter from the Ystrad Gas and Water Company was read at the last meeting of the Rhondda District Council, intimating that they were prepared to dispose of the whole of their water and gas works by arbitration. After a brief discussion, a Committee was appointed "to consider the water question generally, and to conduct an arbitration between the Ystrad Water Company and the Council, with full power to act and engage professional assistance."

Outing of the Employees of the Ilkeston Gas Department.—Last Saturday week, the stokers and fitters employed by the Gas Department of the Ilkeston Corporation enjoyed an outing arranged for them by the Gas Committee, in the shape of a trip to Skegness, and a dinner at the Pavilion. The Engineer and Manager (Mr. F. C. Humphrys) was in the chair; and Mr. J. Beardsley, who has been foreman for more than a quarter of a century, was in the vice-chair. The after-dinner proceedings were very brief; consisting of a loyal toast, and "Success to the Gas Department."

Changes in the Wages and Hours of Birmingham Water-Works Men.—The Water Committee of the Birmingham Corporation have resolved to make some alterations in the hours of labour and wages paid at their pumping-stations. Continuous pumping is necessary to maintain the supply; and hitherto the stations have been worked by two shifts of men, each working twelve hours, except in the larger stations, where they are allowed two hours off for meals. The Committee have now decided to adopt the system of eight-hour shifts from the beginning of October next. The wages of the men have been: Drivers, 5s. per day, and stokers 4s. 2d. per day; each with time-and-a-half for Sundays. When the alteration of hours takes place, the wages will be lowered to 4s. 6d. per day for drivers, and 4s. per day for stokers; the time-and-a-half rate for Sundays being maintained. The men have been allowed, in consideration of their long hours, twelve days' holiday per year, for which no pay has been stopped. Six days' holiday will be withdrawn at the same time; reducing the holidays of the workmen to the level of the other Corporation departments.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 331.)

Issue.	Share	Whe ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	23–24	+1	4 7 6
100,000	10	,,	7½	Do. 7 p. c.	10	15½–16½	..	4 10 11
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	104–106	..	4 14 4
200,000	5	10 May	6½	Bombay, Limited	5	7–7½	..	4 6 8
40,000	5	,,	6½	Do. New	5	5–5½	..	4 14 7
380,000	Stck.	28 Feb.	12†	Brentford Consolidated	100	257–262	..	4 11 7
180,000	,,	,,	9†	Do. New	100	205–210	..	4 5 8
220,000	Stck.	14 Mar.	11	Brighton & Hove Original	100	227–232	..	4 14 10
888,500	Stck.	28 Feb.	5	Bristol	100	125–130	..	3 16 11
320,000	20	28 Mar.	11½	British	20	54–56	..	4 0 4
50,000	10	14 Mar.	11½	Bromley, Ordinary 10 p. c.	10	22–23	..	5 0 0
51,510	10	,,	8½	Do. 7 p. c.	10	17–18	..	4 14 5
328,750	10	12 June	4	Buenos Ayres (New) Limited	10	7¼–8¼	+¼	4 14 1
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	101–104	+1	5 15 5
150,000	20	11 July	8½	Cagliari, Limited	20	28–30	..	5 10 0
550,000	Stck.	10 Apl.	13½	Commercial, Old Stock	100	299–304	..	4 8 9
165,000	,,	,,	10½	Do. New o.	100	225–230	..	4 11 4
160,762	,,	12 June	4½	Do. 4½ p. c. Deb. do.	100	143–147	..	3 1 3
800,000	Stck.	12 June	13	Continental Union, Limited.	100	265–275	..	4 14 6
200,000	,,	,,	10	Do. 7 p. c. Pref.	100	203–208	..	4 16 2
535,000	Stck.	28 Feb.	5½	Crystal Palace Ord. 5 p. c. Stk	100	125–130	..	4 0 9
486,090	10	26 July	11	European, Limited	10	25–26	..	4 4 7
354,060	10	,,	11	Do. Partly paid	7⅛	17–18	..	4 14 3
5,646,590	Stck.	14 Feb.	12½†	Gaslight & Coke, A, Ordinary	100	247–302	+7½	4 4 8
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	107–112	..	3 11 5
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	283–288	+3	3 9 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130–135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	197–202	..	3 14 3
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	190–195	..	3 11 9
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	280–285	+3	3 10 2
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	165–170	..	3 10 7
1,061,150	,,	12 June	4	Do. 4 p. c. Deb. Stk.	100	131–134	+1	2 19 9
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	140–145	..	3 2 1
908,000	,,	,,	6	Do. 6 p. c. do.	100	200–205	..	2 18 6
3,800,000	Stck.	10 May	12	Imperial Continental	100	250–255	–2	4 14 1
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	5¾–6¼	..	4 16 0
560,000	100	1 Apl.	5	Met.of Melbourne, 5 p.c. Deb.	100	115–117	..	4 5 6
541,920	20	12 June	5	Monte Video, Limited	20	16½–17½	..	5 14 3
150,000	5	24 May	8	Oriental, Limited	5	7⅛–7⅜	..	5 3 2
60,000	5	28 Mar.	7	Ottoman, Limited	5	5–5⅛	..	6 7 3
166,870	10	14 Feb.	2	Para, Limited	10	1½–2½	..	8 0 0
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	102–106	..	5 13 2
500,000	100	4 June	6	2nd Do.	100	100–105	..	5 14 3
150,000	10	26 Apl.	7	San Paulo, Limited	10	10–11	..	6 7 3
500,000	Stck.	14 Feb.	15½	South Metropolitan, A Stock	100	355–365	..	4 4 11
1,350,000	,,	,,	12	Do. B do.	100	305–310	+3	3 17 5
308,685	,,	,,	13	Do. C do.	100	310–315	..	4 2 6
800,000	,,	11 July	5	Do. 5 p. c. Deb. Stk.	100	172–176	..	2 16 10
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	230–235	..	4 17 10
				WATER COMPANIES.				
746,021	Stck.	26 June	10	Chelsea, Ordinary	100	290–295	..	3 7 10
1,719,514	Stck.	10 Apl.	8	East London, Ordinary	100	230–235	..	3 8 1
654,740	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	157–162	..	2 15 6
700,000	50	26 June	7	Grand Junction	50	114–118	..	2 19 4
708,000	Stck.	14 Feb.	12	Kent	100	307–312	..	3 16 11
1,043,800	100	26 June	7½	Lambeth, 10 p. c. max.	100	260–264	..	2 16 9
406,200	100	,,	7½	Do. 7½ p. c. max.	100	208–213	..	3 10 5
330,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	145–150	..	2 13 4
500,000	100	14 Feb.	12½	New River, New Shares	100	390–400	..	3 3 9
1,000,000	Stck.	26 July	4	Do. 4 p. c. Deb. Stk.	100	143–148*	..	2 14 2
902,300	Stck.	12 June	4	S'thwk & V'xhall, 10 p.c. max.	100	157–163	..	2 9 1
126,500	100	,,	4	Do. D 7½ p.c. do.	100	140–145	..	2 15 2
1,155,066	Stck.	12 June	10	West Middlesex	100	292–297	+4	3 7 4

*Ex div.

† Next dividend will be at this rate.

GWYNNE & BEALE'S

PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams "GWYNNEGRAM, LONDON." Telephone No. 2698.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

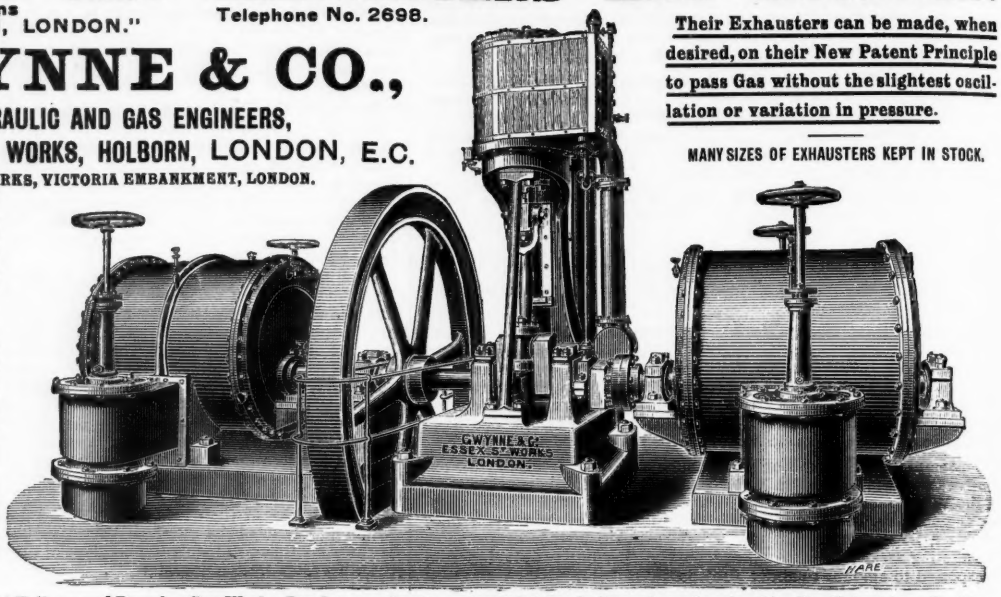
They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.



Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

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Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

JOHN WM. O'NEILL, Managing Director, Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to be addressed to Palmerston Buildings.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. In use in most Continental Gas-Works, and in more than 300 British Gas-Works.

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Telegrams: "Volcanism, London."

AMMONIACAL LIQUOR Wanted. BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR Wanted. BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE Wanted. BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO. Offices: Commercial Buildings, LEEDS. Correspondence invited.

GOLD MEDAL, 1892.

TUBES and Fittings for Gas, Steam, and Water, in stock to 8 inches diameter; Iron and Steel Ascension-Pipes. JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See last week, p. 310.) Telegrams: "HUTCHINSON BROS., BARNSLEY."

BACK-PRESSURE IN PURIFIERS.

THE Valve invented by Mr. Cripps for Bye-Passing any Layer of Purifying Material (referred to by the President of the Incorporated Institution of Gas Engineers in his Inaugural Address) can be obtained of the Makers: C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP, and J. EVERY & SON, Phœnix Iron-Works, LEWES, to which Firms all inquiries should be addressed.

W. C. HOLMES & CO., Huddersfield; AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gas-holders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also Improved Patent Rotary Scrubber-Washers. *** See Advertisement p. II., centre of JOURNAL. Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham. First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c. Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

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JOHN E. WILLIAMS AND CO., VICTORIA PAINT WORKS, MANCHESTER. Telegrams: "ENAMEL." National Telephone 1759.

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JOHN E. WILLIAMS AND CO., VICTORIA PAINT WORKS, MANCHESTER. For all Joints in connection with Oil-Gas Plant and Sulphate Plant. For all Gas Joints. For all Tar Joints. For all Ammonia Joints.

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WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description. Please write for Estimate before ordering elsewhere.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE. Information and Handbook on application. 70, CHANCERY LANE, LONDON, W.C.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c. Head Office MIDDLESBROUGH. Correspondence invited.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. Sample and Price on application. OXIDE PAINTS, OILS, SULPHURIC ACID, &c. 120 and 121, NEWGATE STREET, LONDON, E.C. Telegrams: "BOGORE, LONDON."

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FINEST Quality of Natural Bog Ore. Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c. Telegraphic Address: "PORTER LINCOLN."

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron. Two or three times as rich as Bog Ore. Strong action on Sulphuretted Hydrogen. To be used alone, but will increase activity of other Oxides. Less than half the price of Bog Ore. Can be lent on hire. Write for tabulated results. READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

THE Undersigned is in a position to supply, at the very lowest Prices, the most suitable kind of BENZOL for enriching Gas, made from Hardman's Patent Carbonization Process, of which I am the Sole Patentee. On application, I would furnish Price on the most reasonable terms; giving advice how to utilize it on the most economical method. J. HARDMAN, Manufacturing Chemist. Milton, Staffs.

In Paper Covers, Post Free 2s.

STEPHEN CARPENTER, of the Bow Common Gas-Works, on the Purification of Coal Gas by Lime, Oxide of Iron, and Atmospheric Air, and the Method of Working Purifiers so that the Lime may be used a second time, with a description of Carpenter's short Method of working off the Sulphur Test and Table for calculating Results. S. & H. W. CARPENTER, 3, Bedford Villas, Carshalton, SURREY.

TO ENGINEERS AND MANAGERS.

MR. J. L. FEATHERSTONE (late Chief Draughtsman to Humphreys and Glasgow) is prepared to supply complete WORKING DRAWINGS, SPECIFICATIONS, and QUANTITIES for WATER-GAS PLANT. Own design. Also DRAWINGS, TRACINGS, &c., of COAL GAS PLANT; Specially prepared for work wanted in a hurry. Moderate Charges. Temporary Offices: 27, FORE STREET, E.C.

SITUATION wanted by a Man thoroughly conversant with Gas-Works, also Boiler and Engine Work. Eleven years' present Situation. Married. Good References.
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WANTED, by a Young Man (married), a Situation in Gas-Works, permanent or for the Winter Months. Used to Shovelling and general Retort-House Work. Willing to make himself generally useful. Fifteen years' total abstainer. Good Reference.
Apply to T. W. BUSHNELL, Old Headington, OXFORD.

WANTED, a Situation as Working MANAGER or FOREMAN by a Manager's Son. Practically conversant with Management of Small Works and of Mains and General Fittings, &c. Recommended, and good References.
Address No. 2554, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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Highest References and Testimonials.
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WANTED, an experienced Carbonizer, to take charge of a Works (under a Manager) with a maximum make of a Million. State qualifications.
Address No. 2553, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good steady Gas Stoker, used to Engine and Exhauster. Good Reference indispensable.
Apply to J. G., Manager, Barking Gas-Works, Hart Street, Barking, ESSEX.

CLEETHORPES GAS COMPANY.

WANTED, a capable, trustworthy Man as STOKER. Wages 32s. 8d. per week. Regular Employment to a suitable Man.
Apply to E. J. BROCKWAY, Engineer, &c.

WANTED, an Agent for the Sale of Gas- Retorts and Fire-Bricks, &c., in London and District.
Apply, by letter, with all particulars, to No. 2552, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Spent Oxide for prompt delivery, any quantity, containing not less than 50 per cent. Sulphur.
Apply J. HARDMAN, Milton, STAFFS.

STATION METER.

WANTED, for a Country Gas-Works, a Second-hand STATION METER, in good working condition.
Apply, stating particulars as to Connections, Price, &c., to Mr. ROBERT GILCHRIST, 35, Hope Street, GLASGOW.

FOR SALE—The following Second-Hand GAS PLANT:—
TELESCOPIC GASHOLDER, 45 ft. by 18 ft.
Two TELESCOPIC GASHOLDERS, 60 ft. by 18 ft.
STATION METER, to pass 15,000 Cub. Ft. per hour, Rectangular Cast-Iron Case, by J. & J. Braddock.
WASHER-SCRUBBER, to pass 250,000 Cubic Feet per day, by Kirkham, Hulett, and Chandler, Ltd.
CONDENSERS, Annular, to pass 250,000 Cubic Feet per day, by C. & W. Walker.
STATION GOVERNOR, 12-in., by J. & J. Braddock.
ENGINE, 4-Horse Power, Steam.
74 MOUTHPIECES, 15 inch and 16 inch Round, ASCENSION-PIPES, BRIDGE-PIPES, and HYDRAULIC MAINS, &c., &c.
Most of the Plant is equal to new.
For further Particulars, apply to J. C. Belton, Manager.
By order,
A. MARSTON, Secretary.
Gas Offices, Willenhall.

HAWORTH URBAN DISTRICT COUNCIL.

TENDERS are invited by the above Council for the supply of 1700 Tons of unscreened GAS COAL, to be delivered (in such quantities as the Council may determine) on Rails at Haworth Railway Station, within the ensuing Twelve Months.
Tenders to be forwarded to me the undersigned, marked "Coal Tender," on or before the 19th inst.
WM. ROBERTSHAW,
Clerk.
5, Temple Street, Keighley,
Aug. 3, 1895.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Gloucester Gas- light Company invite TENDERS for the surplus TAR produced at their Works for One, Two, or Three Years, from the 1st day of October next.
The Tar will be delivered into Boats or Barges at the Company's Wharf, on the Gloucester and Berkeley Canal.
Offers to be at per ton of 200 Gallons, and per ton by weight.
Payments, cash monthly.
Further Particulars may be obtained on application to Mr. R. Morland, the Company's Engineer.
Sealed tenders, endorsed "Tender for Tar," and addressed to the Chairman, Gas Offices, Eastgate, Gloucester, to be delivered not later than Wednesday, the 28th day of August inst.
The Directors do not bind themselves to accept the highest or any tender.
By order,
WILLIAM E. VINSON,
Secretary.
Gas Offices, Gloucester,
Aug. 8, 1895.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Cor- poration invite TENDERS for the supply, in whole or in part, of 32,000 Tons of GAS COAL for the Year ending Sept. 30, 1896.
Particulars and Form of Tender can be obtained on application to the undersigned at the Gas-Works.
Tenders, sealed and endorsed "Tender for Gas Coal," to be sent in not later than Noon of the 28th day of August, 1895, addressed to M. B. Dodds, Esq., J.P., Town Clerk, Stockton-on-Tees.
The Gas Committee do not bind themselves to accept the lowest or any tender.
WM. FORD,
Engineer and Manager.
Stockton-on-Tees,
Aug. 7, 1895.

BOROUGH OF CHORLEY CORPORATION GAS-WORKS.

THE Chorley Corporation invite Tenders for Twelve Months' supply of the following for their Gas-Works:—
1. GAS COAL and NUTS, 8000 Tons.
2. LIME.
3. VITRIOL, 80 Tons.
The supply to commence on the 1st of September next.
Forms of Tender for Coal and Vitriol, and any further Information, may be obtained on application to Mr. R. Fearnley, Gas Manager.
Tenders, duly endorsed, to be sent to me on or before Tuesday, the 20th inst.
The Corporation do not bind themselves to accept any tender.
By order,
JNO. MILLS,
Town Clerk.
Town Hall, Chorley,
Aug. 1, 1895.

BOROUGH OF CHORLEY CORPORATION GAS-WORKS.

THE Chorley Corporation invite Tenders for the purchase of the surplus TAR produced at their Gas-Works, for Twelve Months commencing the 1st of September next, delivered in the Contractor's Tanks at either of the Chorley Railway Stations.
Any further Information may be obtained from Mr. R. Fearnley, Gas Manager, Chorley.
The Corporation do not bind themselves to accept the highest or any tender.
Tenders, endorsed "Tar," to be sent to me on or before Tuesday, the 20th inst.
By order,
JNO. MILLS,
Town Clerk.
Town Hall, Chorley,
Aug. 1, 1895.

ISLE OF THANET GASLIGHT AND COKE COMPANY, MARGATE.

THE Directors of the above Company are prepared to receive TENDERS for RETORTS, FIRE BRICKS, and FIRE-CLAY, to be delivered to their Works, at Margate, by the 15th of December next.
For Particulars as to Quantities, &c., apply to the Engineer and Manager, Mr. H. H. Jones.
Tenders, endorsed "Tender for Retorts, &c.," and addressed to the Chairman of the Company, to be received at these Offices not later than the 29th of August.
The Directors do not bind themselves to accept either the lowest or any tender.
By order,
THOS. C. FULLER,
Secretary.
Gas-Works, Margate,
Aug. 9, 1895.

TENDERS FOR COAL.

THE Directors of the Isle of Thanet Gas- light and Coke Company invite TENDERS for the supply of the best NEWCASTLE GAS COAL, to be delivered into the Company's Works at Margate in specified Monthly quantities for One, Two, or Three Years, commencing the 15th of March, 1896.
The approximate yearly requirements will be: First Year, 15,500 Tons; Second Year, 16,000 Tons; and Third Year, 16,000 Tons.
Sealed tenders, endorsed "Coal," on Forms to be obtained from the undersigned, to be sent in on or before Thursday, the 29th of August, addressed to the Chairman of the Company.
The Engineer, Mr. H. H. Jones, will furnish any further Particulars that may be required.
The Directors do not bind themselves to accept the lowest or any tender.
THOMAS C. FULLER,
Secretary.
Gas-Works, Margate,
Aug. 1, 1895.

BARRY URBAN DISTRICT COUNCIL.

GAS COAL AND CANNEL.

THE Committee of the Gas and Water Department are prepared to receive TENDERS for the supply and delivery of from 3000 to 4000 Tons of GAS COAL and 500 Tons of CANNEL, delivered into their Railway Siding, Gas-Works, Barry, Glamorganshire, between the 1st of October, 1895, and the 30th of June, 1896, in quantities, in the case of the Coal, of about 400 Tons per month, and, in the case of the Cannel, in such quantities and at such times as the Manager (of whom any further particulars may be obtained) may require.
The Committee do not bind themselves to accept the lowest or any tender.
Sealed tenders, endorsed "Tender for Coal," or "Cannel," giving the names of Pits from which the Coal will be raised, and the price per Ton (of 20 cwt.) delivered, to be addressed to the Chairman, Gas and Water Department, Barry Urban District Council, Barry, Glamorganshire, on or before Wednesday, the 21st of August.
Gas and Water Offices, Barry,
Glamorganshire, August, 1895.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at the Offices, Willoughby Lane, Tottenham, on Saturday, the 31st day of August inst., at half-past Three o'clock in the Afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 30th of June last, to declare Dividend, for the Election of Two Directors and an Auditor for the ensuing Year, and for transacting General Business.
The TRANSFER BOOKS for CONSOLIDATED STOCKS WILL BE CLOSED from the 17th inst. to the 2nd of September next, both days inclusive.
By order of the Board,
JAMES RANDALL,
Secretary.
Offices of the Company:
Willoughby Lane, Tottenham,
Aug. 9, 1895.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Bell Hotel, Bromley, Kent, on Thursday, the 22nd day of August inst., at Six o'clock p.m. precisely, to receive the Report of the Directors, the Balance-Sheet certified by the Auditor, to declare Dividends, to elect an Auditor, and for General Purposes.
NOTICE IS ALSO GIVEN, that at such Meeting RESOLUTIONS will be submitted to create further SHARE CAPITAL, under the Provisions of the Bromley Gas Act, 1879, by the issue of New Ordinary Shares of £10 each, not exceeding in the whole 1000 of such Shares, and to raise, by the creation of Debenture Stock, instead of borrowing on Mortgage, such further Sum as is capable of being so raised, and to authorize the Directors to issue such Shares and Stock, at such times, upon such terms, in such manner, and subject to such conditions as they may think fit.
The TRANSFER BOOKS WILL BE CLOSED from the 8th to the 22nd of August, 1895, both days inclusive.
By order of the Board,
HENRY W. AMOS,
Secretary.
Offices: At the Works, Bromley,
Kent, Aug. 6, 1895.

COLNEY HATCH GAS COMPANY.

NOTICE OF GENERAL MEETING.

NOTICE is Hereby Given, that the Ordi- NARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, New Southgate, on Thursday, the 29th day of August inst., at Five o'clock in the Evening precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 30th of June last, to declare Dividends, and for other purposes.
By order,
ERNEST L. BURTON,
Secretary.
New Southgate,
Aug. 10, 1895.

PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 TO 1888.

NOTICE is Hereby Given, that the Sun- light Incandescent Gas-Lamp Company, Limited, of No. 39, Coleman Street, in the City of London, have applied for LEAVE TO AMEND THE SPECIFICATION of the Letters Patent No. 11,161 of 1886, granted to Frederick Lawrence Rawson and William Stepney Rawson for "Improvements relating to the Production of Light by the Incandescence of Refractory Materials."
Particulars of the proposed Amendments were set forth in the *Illustrated Official Journal (Patents)* issued on the 31st of July, 1895.
Any person or persons may give notice of opposition to the Amendment (on Form G) at the Patent Office, 25, Southampton Buildings, London, W.C., within One Calendar Month from the date of the said *Journal*.
(Signed) H. READER LACK,
Comptroller General.

NOTICE.

TO GAS ENGINEERS AND OTHERS.

MESSRS. CLAPHAM BROS., Limited, Keighley, Yorkshire, are no longer authorized to Manufacture my CONDENSER and WASHER-SCRUBBERS.
The above-named Gas Apparatus are erected and giving entire satisfaction at the following places: Neath, Lincoln, Sheffield, Ellesmere, Mountain Ash, Malden, Cullingworth, Montreal (Canada), Woodstock (South Africa), Cape Town (South Africa), &c.
These Appliances can now be obtained solely of the undersigned.
Winchester House, London, E.C. J. A. KELMAN.

NOTICES FOR POSTING IN GAS-WORKS.

CARDS suitable for Exhibiting in Gas- Works, directing Officers and Workmen to REPORT all ACCIDENTS witnessed by them, together with the Clause of the "NOTICE OF ACCIDENTS ACT, 1894," specifying the notice required to be sent to the Board of Trade, can be obtained, *price 4d. each, or 2s. 6d. per dozen, post free.*
Section 4 of the "CONSPIRACY AND PROTECTION OF PROPERTY ACT, 1875," has been similarly printed. It is required, under a Penalty of FIVE POUNDS, that a Copy of the Section shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by persons employed thereat. Copies, in large type, on broad sheets (22½ inches by 17½ inches) may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C. *Price 2s. per dozen; 10s. 6d. per* 100. On Cards the same size as those relating to the "Notice of Accidents Act," *price 4d. each or 2s. 6d. per dozen.*

Foap. 4to, Cloth, price 7s. 6d., post free.

Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.

LONDON: WALTER KING, 11, Bolt Court, FLEET STREET.

"BEAR CREEK" CANNEL.

LOG MOUNTAIN COAL, COKE, AND TIMBER CO.,
PINEVILLE, KENTUCKY, U.S.A.
Cable Address: "Hull, Pineville."

LONDON AGENTS:
W. J. WILSON & Co., Suffolk House, Cannon St., E.C.

TO EMPLOYERS, COMPANY DIRECTORS, ETC.

The LAW GUARANTEE & TRUST SOCIETY, LIMITED,

GUARANTEES FIDELITY.

Send for complete Prospectus, containing Balance-Sheet, Copy of Policy, &c., &c.

HEAD OFFICE:
49, CHANCERY LANE, LONDON, W.C.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.,
And at STROUD, GLOUCESTERSHIRE.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO.,

Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c.,

Central Plumbing Works, Town Hall Square,
BOLTON.

Special Attention to Repairs.

Before placing Orders, please write for Estimate.

INCANDESCENT MATERIALS

OF THE VERY BEST QUALITY FOR

Lighting Power and Burning Permanence.

Recommended to Wholesale Buyers.

IN ANY QUANTITY.

Supplied by the

INTERNATIONALE GLÜHKÖRPER COMPAGNIE,

ARNHEIM, HOLLAND.

WRITE FOR SAMPLES.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

LOW MOOR BLACK BED GAS COAL.

YIELD OF GAS PER TON . 10,375 CUBIC FEET.
ILLUMINATING POWER . 17·50 SPERM CANDLES.
COKE. . . . . 75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

GEORGE & JOHN HAIGH,
RAVENS LODGE AND CONYERS' COLLIERIES,
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

NOTICE.

The Incandescent Gas-Light Company, Limited, Hereby Give Notice, that they only supply their Mantles subject to the following express Conditions, which are printed and pasted on each box:—

"The Incandescent Gas-Light Company Limited, in supplying the Mantle contained in this box, grant a Limited License to the purchaser to sell or use the same on the express condition that neither the purchaser nor any other person into whose hands the same may come shall use or sell the said Mantle except in connection, or for use, with Burners sold or supplied by the Company; any other sale or use will amount to Infringement of the Company's Patents. The Company supply Mantles for the purpose of renewals at the nominal price of 1s. 3d., subject to the Conditions and Limitations above set forth."

In the case of *The Incandescent Gas-Light Company, Limited v. Cantelo,* **Mr. Justice Wills upheld the Validity of these Conditions and Limited License; and, in the course of his Judgment, said:—**

"The patentee has the sole right of using and selling the articles; and he may prevent anybody from dealing with them at all. Inasmuch as he has the right to prevent people from using them or dealing in them at all, he has the right to do the lesser thing—that is to say, to impose his own conditions. It does not matter how unreasonable or how absurd the conditions are. It does not matter what they are if he says at the time when the purchaser proposes to buy, or the person proposes to take a license: 'Mind I only give you this license on this condition;' and the purchaser is free to leave it or take it as he likes. If he takes it, he must be bound by the condition."

In the case of *The Incandescent Gas-Light Company v. Hirschfeld and Others,* **the Honourable Mr. Justice Romer certified that the Validity of the Plaintiffs' Patents was established. Infringers in future will be liable to costs as between Solicitor and Client.**

(Signed) FAITHFULL & OWEN,
Solicitors for the Incandescent Gas-Light Company, Limited.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

AUTOMATIC COAL and COKE HANDLING.

We have erected, and are erecting, a number of the most complete

AUTOMATIC COAL AND COKE HANDLING PLANTS

In the World.

☛ We are now engaged erecting a plant to distribute the Coal into 375 Coke-Ovens, each 30 feet long, and convey the HOT Coke on an improved Conveyor to the Blast-Furnaces. We have also on order six Plants to elevate and convey from 200 to 2000 Tons of Coal per day. For the latter, we are supplying three Conveyors, each 72 inches wide, with Cast Steel Chain Elevators and Accessories to suit.

Address:—

NEW CONVEYOR COMPANY, LD.,

3 & 4, Lime Street Square, London, E.C.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS:—

Yield of Gas Per Ton. . 11,205 Cubic Feet.
Illuminating Power, $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE, 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton. . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . $13\frac{1}{2}$ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor $94\frac{1}{2}$ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE AND SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, L TD
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co. Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton . . 10,500 Cub. Ft.
Illuminating Power . . 16·9 Candles.
Coke (of good quality) . . 67·5 per Cent.
Sulphur . . . . . 0·58 „
Ash . . . . . 2·73 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

PIPES, 2-in. to 8-in. PIPES, 2-in. to 8-in. PIPES.

MONIER-WILLIAMS & Co.

IRONFOUNDERS,

MIDDLESBROUGH.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton . . 10,500 Cubic Feet.
Illuminating Power . . 16·9 Candles.
Coke . . . . . 66·7 Coke.
Sulphur . . . . . 0·86 Sulphur.
Ash . . . . . 2·04 Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY, LIMITED,

Newcastle-on-Tyne.

W. H. PARKINSON, FITTER.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

Telegrams "INCLINED, LONDON."
Little & Graham Ltd.
THE INCLINED RETORT SPECIALISTS
GILBERT LITTLE
HORIZONTAL Retort - Settings WITH REGENERATOR FURNACES GUARANTEED.
MAURICE GRAHAM, A.M.I.C.E.
ENGINEERS CONTRACTORS AND Carbonizing Specialists.
3 & 4, LIME STREET Sq. LONDON, E.C.
RIMBAULT

AUSTRALIAN BOGHEAD.

Practical Results in Ordinary Working:—

Gas per Ton . . . 15,100 Cub. Ft.
Illuminating Power . 45·6 Candles.

For Samples and Prices, f.o.b. London or c.i.f. to Continental Ports, apply to

THOMAS RAISON & Co.,
117, LEADENHALL STREET, E.C.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE

90, CANNON STREET, E.C.

KENT'S THICK GAS COAL

RAISED AT

The Wharncliffe Woodmoor Colliery,

BARNSLEY.

Yield of Gas, nearly 12,000 *Cubic Feet per ton of Coal; and Illuminating Power nearly* 17½ *Candles.*

The following is a complete ANALYSIS made by Mr. R. O. PATERSON, C.E., Gas-Works, Cheltenham:—

Specific Gravity (Water 1). . 1·276
Weight of One Cubic Foot. . 79·700 lbs.

PROXIMATE ANALYSIS.

Moisture in Coal . . . . . 2·68 per cent.
Volatile Matter. . . . . 35·60 „
Fixed Carbon . . . . . 58·80 „
Sulphur . . . . . 0·96 „
Ash. . . . . 1·96 „

COMMERCIAL ANALYSIS.

Gas per Ton of Coal . . . . 11,760 cub. feet.
Gas per Cubic Foot of Coal . 418 „
Illuminating Power . . . . 17·44 candles.
Value of One Cubic Foot in Sperm . . . . . 418 grains.
Value per Ton of Coal in Sperm . . . . . 703 lbs.
Coke per Ton of Coal . . . 1367 „
Coke . . . . . 61·05 per cent.
Ash in Coke . . . . . 3·21 „
Sulphur Eliminated with Volatile Products per Ton of Coal 9·4 lbs.
Sulphur in Coke per Ton of Coal . . . . . 12 „
Ammoniacal Liquor per Ton of Coal . . . . . 19·7 galls.
Tar per Ton of Coal . . . . 12·2 „

R. O. PATERSON, C.E.

Gas-Works, Cheltenham, 8th August, 1894.

For Price, &c., apply to the

Wharncliffe Woodmoor Colliery Co LIMITED,

BARNSLEY;

Or to Mr. W. H. HARVEY,

17, Old Queen Street, Westminster, S.W.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, MINER, AND SHIPPER OF

NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

5, PRINCES STREET, PORT GLASGOW.

Telegrams: "HUNTER, PORT GLASGOW."

Established 1872.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

CRIPPS' PATENT VALVE FOR BY-PASSING PURIFYING MATERIAL IN PURIFIERS.

The PRESIDENT OF THE INSTITUTION OF GAS ENGINEERS, in his Address, stated—

"To overcome back-pressure, Mr. F. S. Cripps has designed a special form of Valve fixed in conjunction with each layer in Purifiers, and operated from outside the vessel. By this means, any tier can be by-passed as it is fouled, and free access given to the superposed one."

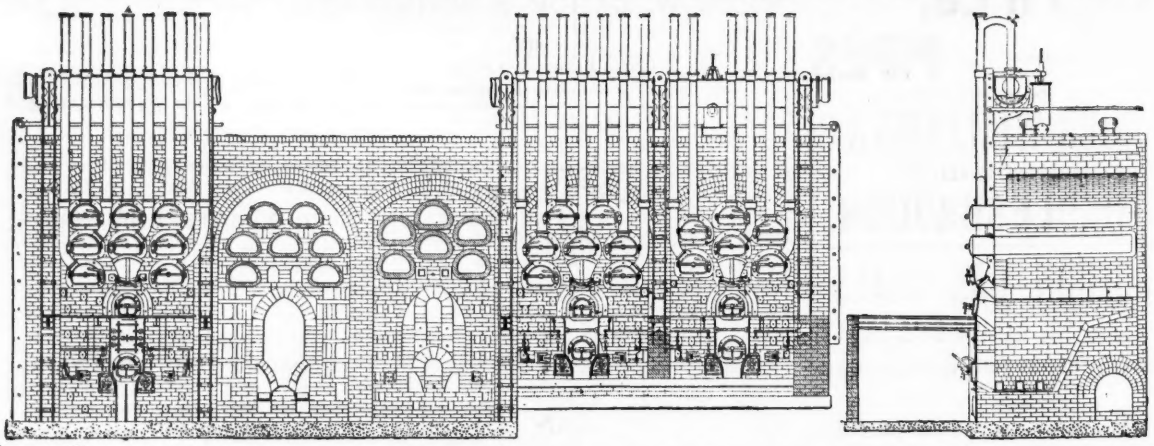
This Valve enables Purifiers to last much longer, without the cost of changing, by permitting the Gas to pass by the Lower Tiers when exhausted, and entering the Upper Tiers only; thus doing away with the heavy Back-Pressure of the Lower Tiers, and fully using up the unexhausted Material in the Upper Tiers.

Will save their Cost in Six Months **Can be fixed to Purifiers in use, as well as New Purifiers.**

Makers { **C. & W. WALKER,** Midland Iron-Works, Donnington, nr. Newport, Shropshire.
and **J. EVERY & SON,** Phœnix Iron-Works, Lewes, Sussex.

To whom all Inquiries should be addressed.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR-PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON,** Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine quâ non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.

Under G. R. HISLOP'S Patents, all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.

Further Information and Pamphlets from Principal Agent.

ALEX. C. HUMPHREYS, M.Inst.C.E. A. G. GLASGOW, M.E.

MESSRS. HUMPHREYS & GLASGOW

Have constructed their EUROPEAN type of

CARBURETTED WATER-GAS PLANTS

At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Brussels	700,000 Cub. Ft.
Belfast	1,700,000 ,,	Liverpool	2,500,000 ,,
Glasgow	300,000 ,,	Tottenham	600,000 ,,
Santiago	400,000 ,,	Brighton	1,250,000 ,,

And have now under Contract:—

Belfast (Second Contract)	3,500,000 Cub. Ft.	Manchester	3,000,000 Cub. Ft.
Swansea	700,000 ,,	Bath	1,000,000 ,,
Preston	1,500,000 ,,	New York	1,000,000 ,,
Southport	750,000 ,,	Newburgh	350,000 ,,

In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

9, Victoria Street, London, S.W. Telegrams: "EPISTOLARY, LONDON." *United States Office, 64, Broadway, New York.*

TRADE MARK
HOUSE'S CEMENT

USED BY 350 GAS-WORKS.
HOUSE'S
For High Pressures, Cylinder Covers, Steam, Gas, and Water Socket and Flange Manholes.
A Month's free trial.
JOINTING CEMENT
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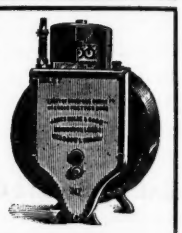

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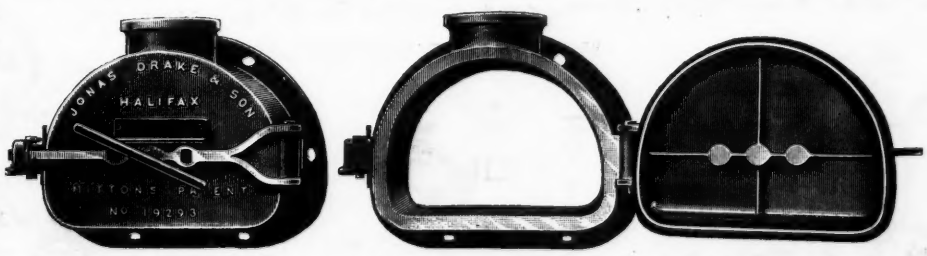

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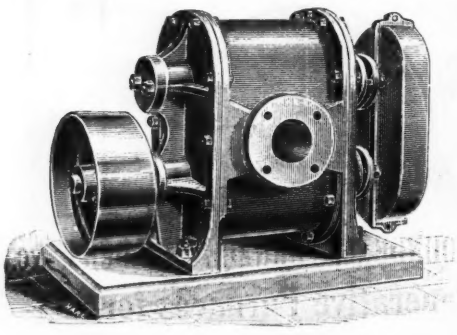

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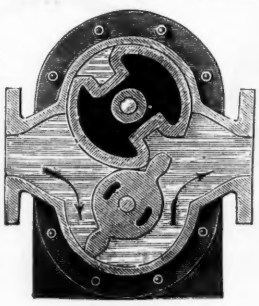

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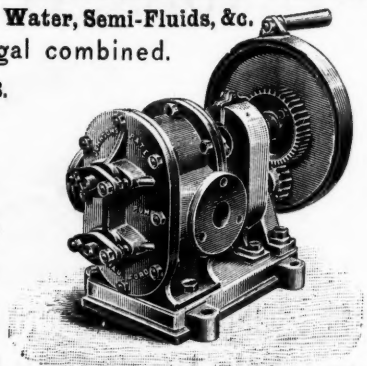

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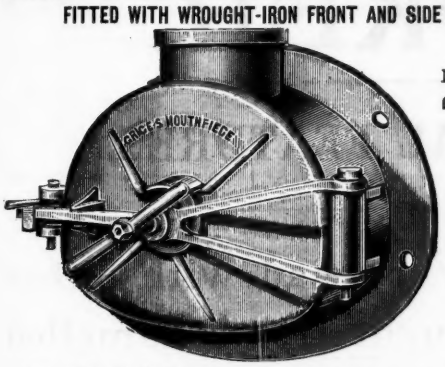

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[See Illustrated Advertisement, Aug. 6, p. 307.]

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[See Illustrated Advertisement, Aug. 6, p. 311.]

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[See also Advt. p. 326.

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